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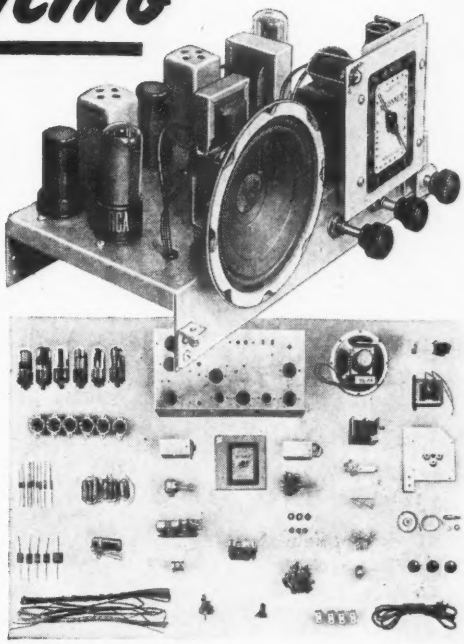

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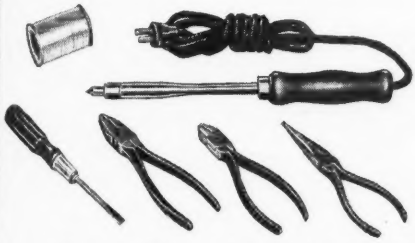

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MARCH, 1948 VOL. XXXIX, No. 5

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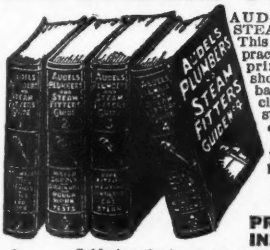

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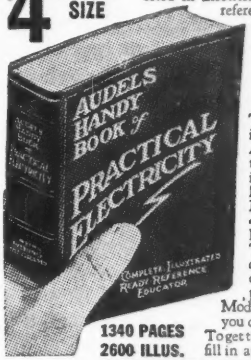

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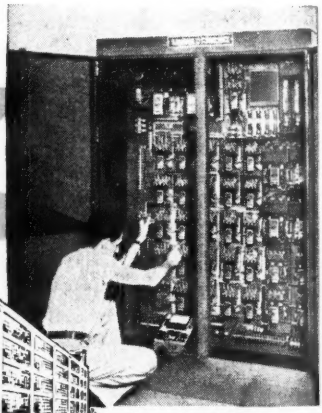

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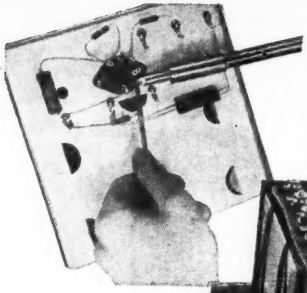

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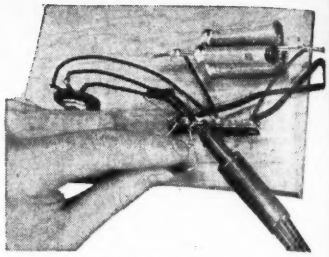

KIT 3 *(above)*

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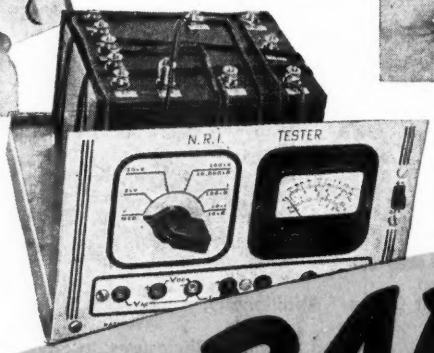

KIT 2 *(right)*

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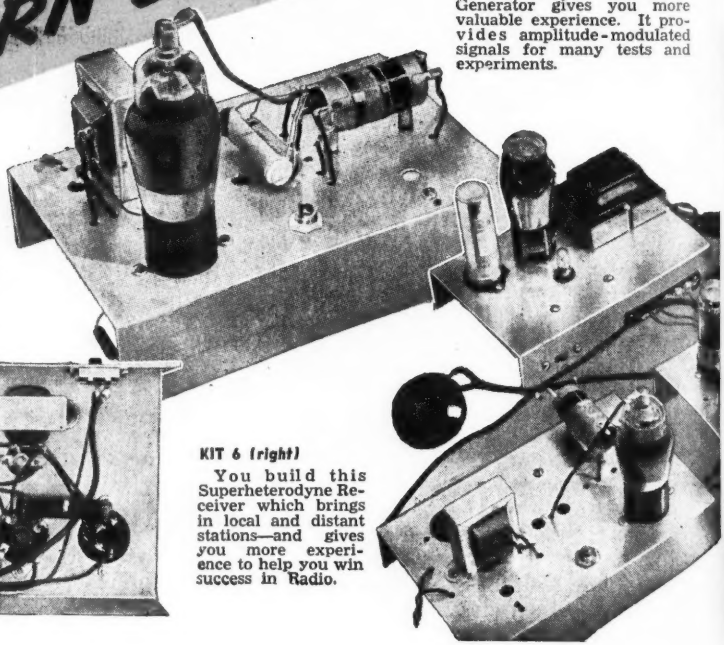

KIT 4 *(below)*

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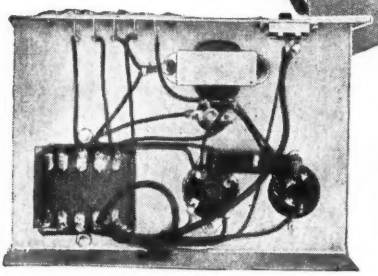

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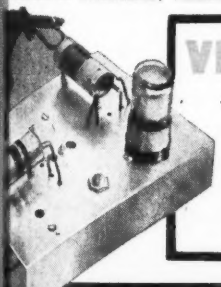

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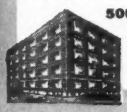

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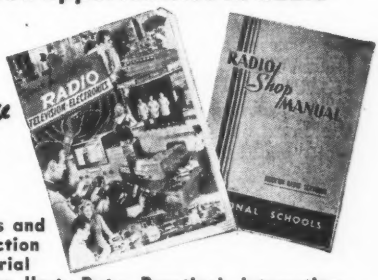

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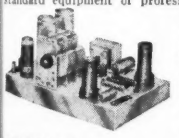

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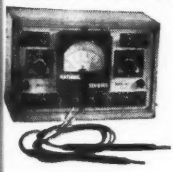

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With new presses going into action in our huge Louisville, Ky., plant, we'll soon be able to revive other popular pre-war MI "one-shots." Tentatively on the schedule are brand new editions of MODEL BUILDERS MANUAL, HANDY MAN'S HOME MANUAL and HOW TO BUILD IT. Meanwhile, treat yourself to a copy of the boat book, buy some lumber and a white cap, and become a happy week-end skipper.

Gatti Has Gone

After some unavoidable delays in gathering needed supplies, the Gatti-Hallicrafters Expedition to the "Mountains of the Moon" in Africa has gotten under way. By the time this issue of MI appears, Commander Attilio Gatti will be unloading half a freighter of cargo in the hot port of Mombasa, Kenya Colony, British East Africa. From there he will proceed into the heart of the picturesque Tanganyika Territory, where he will explore wild areas with unpronounceable names. MECHANIX ILLUSTRATED has contracted with Comdr. Gatti for a series of profusely illustrated articles describing his adventures, and these will appear shortly.

This project is the eleventh venture of veteran explorer Gatti into the interior of Africa, and the first since 1938-1940, when he and his wife astounded the pygmies of the Belgian Congo with his palatial streamlined "jungle yacht" trailers. His fleet for the 1948 expedition is probably the most elaborate and completely equipped collection of trucks, trailers and boats ever used for overland travel by a private party. ("Expedition de Luxe," May, 1947 issue of MI.)

The radio facilities, provided by the Hallicrafters Company of Chicago, are especially lavish and will enable Gatti to maintain constant contact with the outside world and with separate little exploring teams that will work out of his base camps.

[*Continued on page* 20]

Taking giraffes to Africa seems pretty much like carrying coals to Newcastle, but in the case of the Gatti-Hallicrafters Expedition it makes lots of sense. Their giraffes are not animals, but a special type of photo light with a long extension neck. They'll be used in taking night and indoor pictures in Africa, and some of these will appear in MI. The photo on the left shows Chief Photographer Weldon King (right) and assistant Erroll Prince demonstrating the giraffes in front of Comdr. Gatti's private trailer at a preview of the expedition's equipment in New York during November, 1947.

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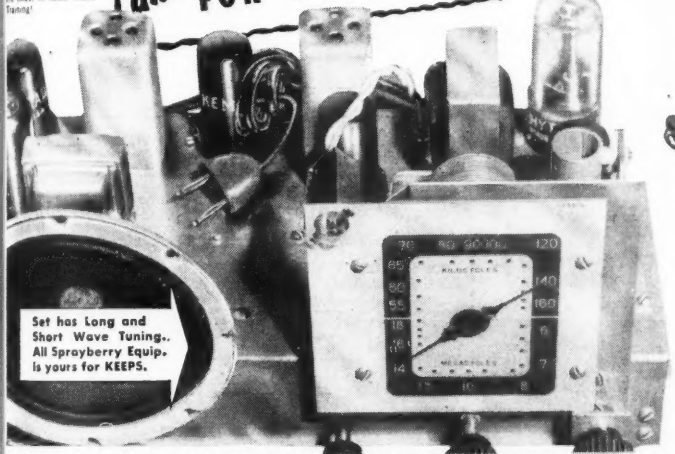

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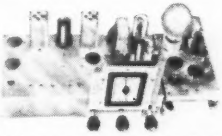

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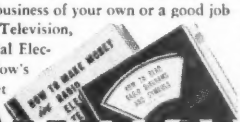

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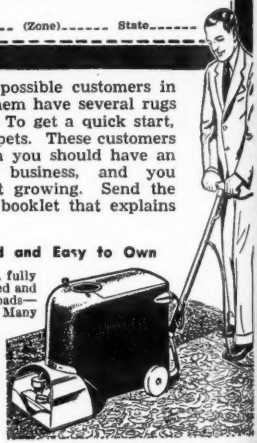

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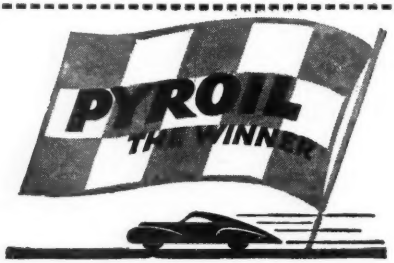

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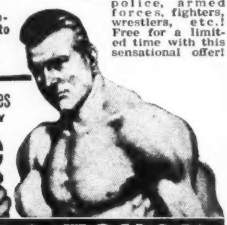

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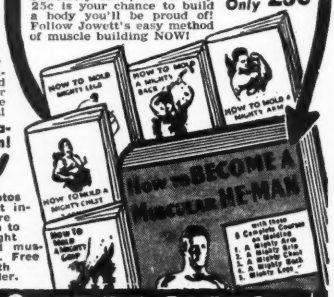

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Editor's Workbench Chips

[*Continued from page* 14]

Owners of sensitive shortwave receivers in the United States probably will be able to hear many of his transmissions directly.

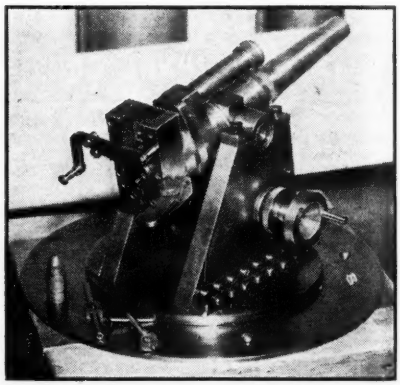
IS YOUR CAR SENTIENT?

After looking over England's offering to the automotive world in the shape of the new Rolls-Royce, we have come to the conclusion that the average American mortal will still stick to his Chevy, Ford or Plymouth. However, a disturbing note did creep into our innermost being and made us wonder whether, after all, we should not swap our new buggy for a Rolls. Said disturbance was caused by the following which appeared in the descriptive matter handed out to prospective Rolls-Royce owners:

"The Silver Wraith (the new Rolls-Royce) . . . is a car which is a sentient being and is like a living thing. Imaginative persons might easily believe that the Wraith's feelings could be hurt by a carelessly casual or definitely dangerous driver. Offended dignity might cause it of its own volition to move quietly off to more congenial company . . . It has perfect manners."

That's what we need, *cars* with perfect manners!—*The Editor.*

MODEL HOWITZER



Here's one of the finest examples of workmanship the Editor has seen in a long time. Mr. K. C. Valentine of Walpole, Mass., writes, "This model gun is 0.44 caliber and is 18 calibers long. It has no exact prototype but is a composite of several guns for facility of construction. It was designed and made in my home workshop from bar and sheet stock, most parts being cold rolled steel. Bearing surfaces are brass." Very neat work, indeed. A $5.00 check and a Workbench Award are yours for this trim job.

[*Continued on page* 41]

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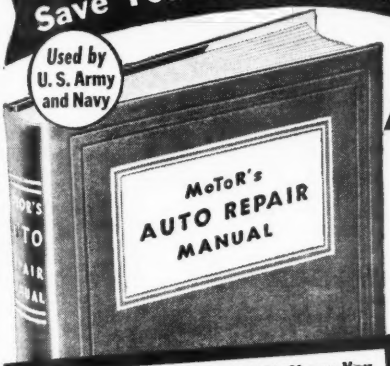

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To facilitate the answering of their mail, readers desiring the advice of Mr. Kraus on inventions matters are requested to observe the following simple rules: 1) Type or write clearly, on one side of the paper. 2) Make sure that your full name and address, including street number and postal zone, if any, are on the letter and all accompanying papers. 3) Mail drawings or photographs flat, not rolled, and include postage if you want them returned. 5) Do not ask questions relating to patent laws. 6) Do NOT send models.

With a background of 25 years of experience in inventions procedure, Mr. Kraus will "call his shots as he sees them" by answering as many letters as possible in this column. His services are free.

Match—Cigarette Package

Lee Bishop, of Wendell, Idaho, recommends that matches be affixed to packages of cigarettes. He had the idea searched and gives the attorney's report.

ANSWER: *No doubt cigarette smokers would find it convenient to have a paper of matches attached to cigarette packages, but it is not likely that the smokers would want to pay an extra half cent for the convenience.*

Many methods have been designed for doing just this sort of job. In some of the earlier cigarette vending machines the matches were attached to the cigarette package with a small strip of Scotch tape; in others a spot of glue was used. Such machines now have a special compartment from which matches are released.

Your attorney left the decision for further action entirely up to you, but did warn you that you never could expect an exclusive right to the combination. In our opinion, unless you have a lot of money you are willing to gamble in a venture which has but little chance of success, you had better forget this scheme. If matches are affixed to packages it is likely that the stringent rules applying to the shipment of matches would likewise appertain to the combination. As it is, the past history of this combination is studded with failures to which you need not contribute another stone.

Adjustable Lathe Chuck Stop

Paul W. Graves, of Oakland, California, wants to know if we think his adjustable chucking stop which may be locked from the front has sufficient merit to warrant further exploitation.

ANSWER: *Perhaps the only reason why you have not been able to get anyone to distribute the tool which you have designed and produced is that you have not contacted the right distributor.*

To use this tool seems to hold much promise. Many is the time I wished for something of a similar nature, particularly when it came to setting up short, round stock in an automatic centering chuck and wanting to true it in jig time.

I suggest that you take up the distribution with manufacturers of lathes; also, that you contact a number of large dealers who specialize in lathe supplies. In our opinion you should not give up now. The pioneering work has been done. The tool has demonstrated its value. Would recommend that you also supply Morse taper adaptors to fit all lathes. By all means keep pushing this item. It should produce good results.

Color Photography

Paul D. Shea, of Rutland Heights, Massachusetts, wants us to settle an argument about obtaining color photographs from black and white films.

ANSWER: *Yes, several devices have been made to convert a straight black and white positive to color on the screen. The early color films male by Kenamacolor used black and white film. Pictures were taken through revolving color filters. On projection the projector also had revolving filters in front of the lens. The Eastman lenticulated film method also employed black and white positives.*

In fact, the best color photography I have seen was black and white on the film, but on projection appeared in its true colors. Flesh tones looked like flesh, skies looked light blue instead of ultramarine, and there was a decided color difference between a banana, lemon, orange, pear, grapefruit, and yellow apple. The method has not yet been introduced on the market. It was patented by Fred T. O'Grady. He takes pictures through a split filter producing two images side by side on the same frame of the movie film, then projects them through a filtered, split lens. Pictures are superb in their naturalness.

[Continued on page 24]

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[*Continued from page* 22]

Folding Table

C. V. Hughes, of Jacksonville, Florida, has designed a breakfast table which folds into a cabinet. He will apply for a patent if we think that it looks good.

ANSWER: *Folding tables always have a reasonably good market provided that you are in a position to manufacture them or can be assured of having them manufactured for you. Sometimes it also is possible to sell the patent to a manufacturer.*

You see, there is no manufacturer who could not design a table which would collapse into a cabinet and such a design need never conflict with any claims which you might establish for your product. So if some local lumber company would be willing to manufacture this article for you, or if you feel that you or some cabinet maker could do so, determine a satisfactory price at which you would be willing to sell the article with a profit to you and the dealer. We then suggest that you plant one or two of these with their improvements in some local furniture store to get a buyer's reaction. If success crowns your efforts, we recommend that you apply for a patent. Of course, we are assuming that a search will have been made and that the attorney's report will have been satisfactory toward such application.

Safety Brake

Norman W. Hayes, of Waltham, Massachusetts, sends patent pending specifications for a safety brake which he wants us to evaluate.

ANSWER: *In your specifications you state that if for any reason the foot and emergency brakes fail to hold, your safety brake will do the trick. This is not our impression of the operation of this device.*

You should have stressed that your brake will work if the cables (number 13) are intact,

[*Continued on page* 28]

INVENTORS

When you are satisfied that you have invented a matter of value—write me, without obligation, for full information as to what steps you should take to secure a Patent or Trademark.

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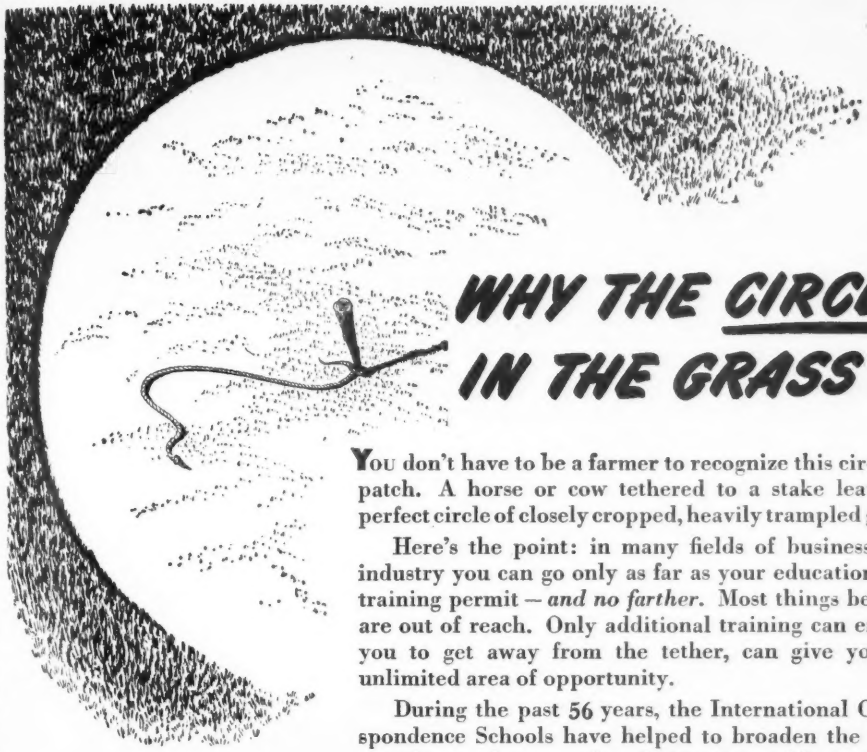

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Your Invention Clinic

[*Continued from page 24*]

if the brake shoes are in working condition, if the drums also are not worn. Further, the engine must be working and the booster tank must be in good condition, as must all of the tube connections.

Frankly, we do not think that your device could be called a safety brake at all. You demand that too many of the car's mechanisms be in perfect condition. A safety brake should be as its name implies, operable when all other forms of braking fail to function. Your design does not permit of this.

Vacuum Pump Carburetor

Edgar N. Gillette, of Raymondville, Texas, sends a design of a fuel pump which works on the vacuum principle. Its purpose is to eliminate the fuel pump and make for a less expensive construction:

ANSWER: *You certainly have developed an involved piece of apparatus to substitute for the relatively simple fuel pump. And there is no assurance that your carburetor will work. On the contrary, we think that you will be lucky indeed if you can get this design to function at all. You demand three seating ports of rather large size in each half of the carburetor. All six must fit accurately. Failure of any of the three on one side will mean that all three fail to seat. Then you assume that the float will lift the seated valve against the action of the negative pressure established by the engine. This is too much to expect of a device which is to be delicately mounted.*

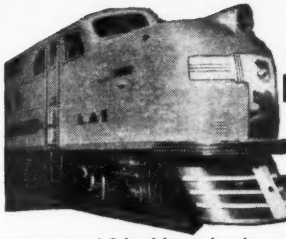
This carburetor design certainly seems more expensive to manufacture and appears to be more troublesome than any carburetor-pump combination in use today. Forget it.

Duplex Flashlight

Vance L. Allen, of Wichita Falls, Texas, wants to know if we think it advisable for him to confront manufacturers with the details of a duplex flashlight on which he has had a patent pending for more than thirteen months.

ANSWER: *It is always best to consult your patent attorney to determine if he considers it safe to negotiate for the sale of a patent which is pending. If he thinks it is okay to do so we would recommend that you try to dispose of this idea as soon as possible. We hold but little hope for its sale. Your construction demands two switches, requires two bulbs, one of which is a double filament, two reflectors and a double battery. On the whole, the cost would be about as great as two flashlights. But the security is halved; general usefulness is as effective as but one flashlight.*

[*Continued on page 30*]



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Your Invention Clinic

[*Continued from page 28*]

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Hair Comb

George F. Benco, of Philadelphia, Pennsylvania, sends a design for a hair comb which among other things may "impart a gentle exercise to the hair."

ANSWER: *Strange virtues often are attributed to all sorts of devices, so it is not unusual to find people talking about "exercising the hair" and claiming outstanding virtues even for a comb.*

Would you say you could exercise the trunk of a tree? The hair grows from the hair root. The only things you can do to it after it has developed its shaft is to wave, straighten, curl, bleach or dye, and stretch or shrink it. You also can apply all sorts of greases, waxes and other stick-ums. So forget the exercise stuff. The user, not the hair, gets the exercise.

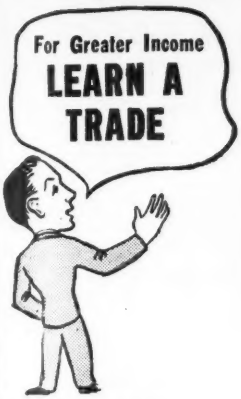
In our opinion, you have made a notable contribution to the construction of a comb, but we would be willing to bet that your design is no easier to keep clean than any other comb with widely spaced teeth. The oil natural to the scalp, assuming that no other materials have been applied to the hair, will come off on the teeth and settle there along with any dust. This gummy material must be brushed or washed out if you want a clean comb.

Why not look at the picture for what it is, and not try to invest the comb with some sort of supernatural powers which simply are not there? You have a good design. It could be made at a rather low cost. It is possible to make it colorful. Its special design gives the effect of widely spaced teeth for cleaning, yet in use it presents a close-toothed effect. Color combinations for special purposes are possible. These are outlined in a personal letter to you. You have here a highly personalized article which looks good to us. We would suggest that you have a search made and if favorable you should apply yourself to the thought of proceeding further.

Permanent Magnet Motor

G. Gillespie, of Savannah, Georgia, wants to know if we think it possible for him to patent an idea for a permanent magnet motor which he designed after making some experiments in a modest way.

[*Continued on page 33*]



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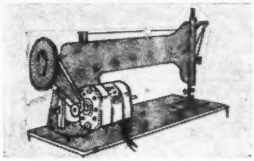

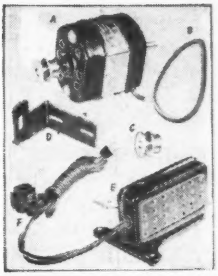

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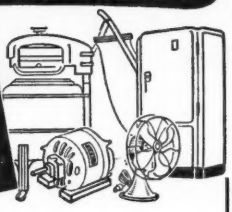

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Your Invention Clinic

[Continued from page 30]

ANSWER: *Prior to 1579 the first accounts of experiments were published outlining the possibility of producing motion by the action of permanent magnets. Since that time inventors have tried to get similar devices to work and have always failed. Your motor falls into the same category.*

Here is the scientific explanation. A magnet gives just as much of a "push" as it does a "pull." You cannot get one effect without countering the opposite action. In your design any "turning" effort which you expect to get will be exactly equal both clockwise and counterclockwise. Hence the "motor" will stand still unless spun by hand and then the part rotated will come to a stop more quickly than would a similar balanced weight of non-magnetized metal. Sorry, but you simply cannot get this design to work. Others have tried before you. Even the great improvement in magnets will not change the ultimate picture.

Inventors' Service Bureau

Lee W. Boltz of Hartford, Wisc., writes: "In the July issue you answered a letter of Capt. O'Connell of Oklahoma, in which you stated you knew of no clearing house for inventions and you felt that there should be one.

"For years I have followed different writers through their articles and columns on inventions, with but one thought in mind. How could I bring the inventor and those who would be interested in buying or manufacturing his invention together? Will you tell me how such an invention mart should be set up?"

ANSWER: *First and foremost, such an organization will require a large financial endowment. It must be free to operate with no strings attached to its decisions; it must give equal weight to the judgment of what commonly are called "crackpot" ideas along with those which possess quickly understandable merit. Hence it will need a large and well-trained staff. Connected with it should be trained legal counsel. Fortunately, the country's patent lawyers are so trained and probably would work for the mart. The organization will need an all-around experimental shop where approved suggestions can be put into blueprints, then reduced to practice; where models can be given thorough tests. Here, again, much of the work can be farmed out; but, in the main, the final assembly and demonstration should be made at the mart. It will need extensive contacts with industrial organizations interested in producing new items, yet must be able to set up*

[Continued on page 35]

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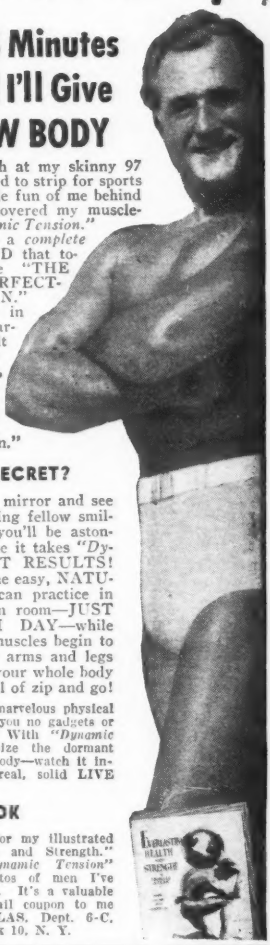

PEOPLE used to laugh at my skinny 97 lb. body. I was ashamed to strip for sports or for a swim. Girls made fun of me behind my back. THEN I discovered my muscle-building system—*"Dynamic Tension."* It turned me into such a *complete* specimen of MANHOOD that today I hold the title "THE WORLD'S MOST PERFECTLY DEVELOPED MAN."

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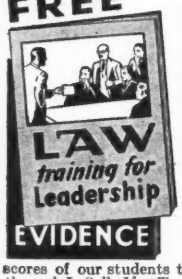

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Your Invention Clinic

[*Continued from page 33*]

manufacturing machinery if entirely new concepts are forthcoming from inventors. It will need promotion, publicity, magazine and radio tie-ups. All of these things are out-of-pocket expenses.

The invention judging committee must have an understanding broad enough to see the possibilities of inventions suitable for a long or short haul; it must be willing to recommend risking all costs, must make a righteous effort to promote every item chosen after its technical bugs have been removed. On the other hand, no inventor would object to giving the mart a share of his royalties or a percentage on direct sale, particularly when he is assured that no financial benefit will accrue to any person and that all such funds will be used for furthering other new products. At no time must the decision on any article be motivated by a desire to keep the financial structure of the mart in a fluid state. Finances must be assured even before the organization starts to function.

What a new invention might mean to the industrial wealth of this country never can be measured in dollars and cents. Repeatedly it has been claimed that the invention of the electric light, directly and indirectly, is responsible for 20 per cent of the national income. No one estimates the value in dollars and cents to the health, eyesight, safety, longevity and pleasure of the inhabitants. But look at the job Edison had to do to put the idea across. Examine the financial struggle which most successful inventors had. Brilliant minds should be allowed freedom from business and sales details so that they can give more time to the development of new articles or industries. There is at least one non-profit-making, tax-exempt organization in this country with a charter so broad that it could act in the manner described—if funds were available to do so. That is the detail upon which hinges a truly wholesome program of this sort. Now read the next letter.

Service Bureau Client

Arthur E. Burnell of Mankato, Minn., in the same mail, writes: "At the suggestion of the editors of True Magazine I am writing you for some information.

"Many years ago I heard of an organization devoted to helping our amateur inventors. For those who could not afford the expense of obtaining a patent, a loan was made. After the patent was granted, help was given to sell or otherwise dispose of it. Later, after profits were made, this organization was reimbursed to the extent of the investment. Do you know

[*Continued on page 37*]

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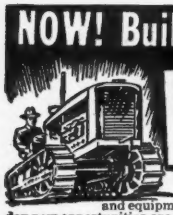

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Your Invention Clinic

[*Continued from page 35*]

of any such organization?

"I have an invention which should meet a popular demand, but am financially unable to meet the necessary expenses."

ANSWER: *Any organization which professes to adhere to this highly Utopian method of operation could not continue to function very long. It gambles on its ability to detect value in an invention which has neither been made nor sales-tested, it gambles on the inventor's knowledge of manufacturing, salesmanship, and knowledge of his understanding of the public's response. It takes a chance in assuming that the inventor's financial structure and that of his organization will remain sound. Then it gets only its original investment back. Meanwhile it must pay salaries to clerical help, investigators, must cover costs of office rental, furniture, service, stationery, postage, light and phone service. Obviously, such a scheme is not sound.*

On the other hand, many organizations have offered to help inventors in a minor sort of way and along limited lines. Three of them have stated that they will produce any article within their manufacturing facilities "bearing your approval" (meaning ours), and insist on remaining anonymous. Such benefactors should be heralded. Many more are needed. Readers of this column can supply the brains and products.

Coin-Wrapping Device

Hermann Miehle of Long Island City, N. Y., writes: "Thank you for your wonderful advice (June issue). I now have a swivel selector attached to one of the rods. I have placed this in the hands of an organization which is considering its production if they can find a market for one hundred thousand pieces.

"Enclosed find photographs of a device to fasten to a drill press, which allows holes to be drilled in a circle or degrees within two or three thousandths, checking from any point. I am able to do work within 15 minutes with this device which usually takes 2½ hours to finish."

ANSWER: *The company planning production of the coin-wrapping device should find little difficulty in visualizing such a sale. There are 453 banking establishments in Manhattan alone and most of them could use several of these coin wrappers, to say nothing of the thousands of mercantile houses where similar equipment could be used to advantage.*

Again we find that your drill press attachment could be improved without adding to the cost of production to any great extent. A vernier scale on the needle plate would permit

[*Continued on page 39*]

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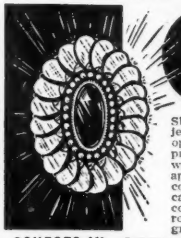

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Your Invention Clinic

[Continued from page 37]

of greater accuracy and closer predeterminations without the setting of the guide hole.

Even though we think that you will have greater difficulty in establishing a market for this article, we consider it worthy of further investigation. Have a search made to determine patentability. If favorable, careful but continuous pressure should be given toward its patenting and marketing.

From what we have seen of your work, you appear to be just the sort of person who answers one of the requirements outlined in the letters above. Your hours spent as an inventor should not be molested by business details.

Improved Bottle Cap

James W. Tanfield of Jersey City, N. J., wants us to comment on a bottle cap which needs no instrument to effect its removal.

ANSWER: *Search will disclose that many caps have been patented with all sorts of lips and other arrangements to permit removal without the aid of an opener. Yet none of these is available on the market. There must be a reason!*

Obviously, if the companies making the crimp type of cap do not look on your idea with favor, you can do nothing with your patent. And there is a good reason why they should not do so. Your cap will be more expensive to produce. Not only must new dies be made, but the weight of the cap becomes greater. True, this is not much in the case of a single cap, but it does amount to a lot when you consider the great numbers of caps which are sold every day.

Even assuming that you will not use any more metal than you can cut from that part of the sheet which is wasted today, there still is the extra weight of the caps which adds to the cost of shipping them.

Again, your style of cap may not fit all cap-applying mechanisms. This would mean that costly changes must be made in the machinery. And lastly, you will want some sort of financial return from your invention. This means that your cap will cost more than the common style. So the same amount of material packaged in a bottle with your type of cap will cost more than it would with the current style of cap. Because manufacturers do not want to cut into profits, there would be little chance of selling your design. And the public doesn't want a product because it has an easy opening cap.

Great care should be exercised in going further with this idea. The background history is replete with failures in attempting to go one better on caps.

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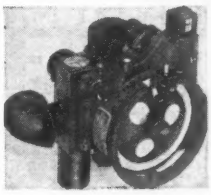

These Army Air Forces Bubble Sextants cost the Govt. about $125 each. A real bargain at our price of $12.50! Included with Bubble Sextant shipment is wooden Carrying Case, 5 spare waxed paper discs, flashlight with rheostat for night use (uses ordinary flashlight cells—not furnished) aux. 2-power Galilean Telescope, Allen wrench, 1 spare marking point. Wartime used, but where necessary completely repaired, collimated and put in good working order. If not satisfied that Sextant is exactly as represented, return within 10 days and money will be refunded. Full directions for use accompany each shipment.
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Editor's Workbench Chips

[*Continued from page 20*]

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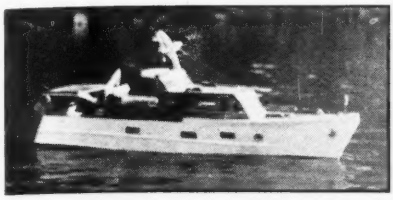
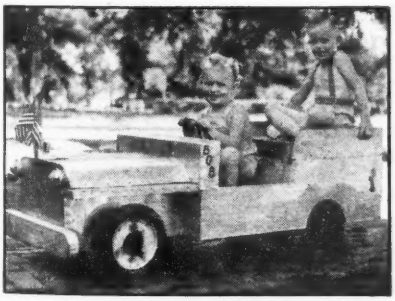


This super-detailed model of a flying bridge cruiser is the work of Mr. Herbert Imbert of Jackson Ht., N. Y., and represents a total of about 520 hours work with an investment of $200 for materials. The model is 48 in. overall with a beam of 13 in. and a height of 18 in. to the top of the mast. She is powered with a 27 volt motor supplied by batteries and the rudder is radio controlled by means of a Bell System Unit. For his unusual craftsmanship and painstaking attention to detail, we're sending Mr. Imbert a $5 Workbench Award.

MI'S MATEY

This 10-ft. V-bottom dinghy was built from MI. Plans by Art Solum of Portland, Oregon. For the craftsmanship displayed in building, we're sending Mr. Solum a $5 Workbench Award.

ANOTHER JEEP FOR JUNIOR



Joe Binkley of Chanute, Kansas, sends us this picture of the Jeep for Junior which originally appeared in the September, 1946, issue of MI. Nice work, Mr. Brinkley. We are glad to send you a $5.00 Workbench Award.

The Importance of Choosing a Long Established Technical Institute

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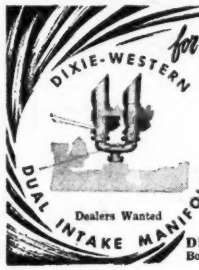

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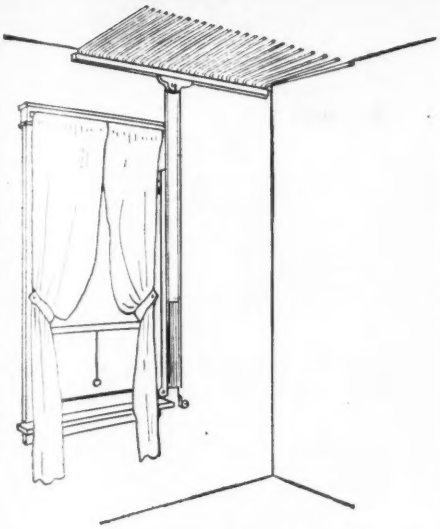

A clothes drier which may be attached to a window frame and which is particularly suited for apartments has been patented by Walter K. Harris of Richmond, Va. The drier includes a clothes supporting unit which carries projections for supporting clothes. The projections are foldable to facilitate handling and shipping. The clothes unit is movable on a guideway, the movement being controlled by a crank mechanism for raising and lowering the clothes unit. The entire device can be readily attached to either a door frame or a window frame by means of suitable clamps.

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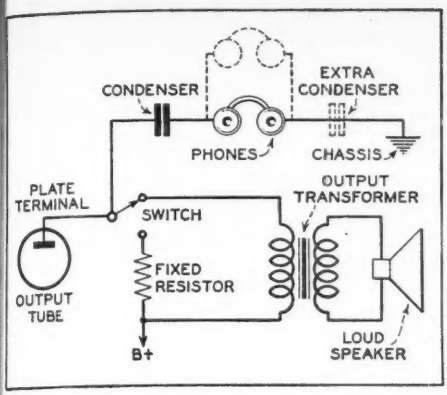
Earphone Adapter



Earphones are connected into plate circuit of output tube. See text for values of resistor and condensers.

After suffering through the nightly series of children's radio programs that my two youngsters had to hear before their supper, I hit upon a simple idea that enables them to enjoy themselves without annoying their parents. I connected earphones to a small receiver, and now the kids sit as quietly as mice; in fact, they consider the earphones a special kind of fun. The arrangement also works fine when either my wife or I disagree on what to tune in. Whoever wants to hear his or her favorite program puts on the phones and enjoys it, while the house itself is peaceful and quiet. It's a wonder manufacturers don't include earphone connections.

Making the hookup is the work of only a few minutes. Find the plate terminal of the output tube, the one that runs to one terminal of the output transformer, which is usually mounted on the loud speaker. Follow the simple diagram as shown. The single pole double throw toggle switch may be mounted conveniently on the back of the chassis. The condenser is of the paper tubular type (NOT electrolytic), 400 volts working rating, and is not critical as to capacity. I have tried .05, .1, .25, .5 and 1.0 mfd. and they all work fine. The fixed resistor is not critical either; 1000, 1500 or 2000 ohms all seem to work about the same. Be sure it is of 5 or 10 watt rating.

If the receiver is of the straightforward AC type, only one condenser is needed, and one terminal of the phones goes directly to the "ground," or the chassis. If the receiver is of the AC-DC type, use an extra condenser as shown by the dotted symbol in the diagram. The purpose of the condensers is to keep the high plate voltage out of the phones, but at the same time to pass the audio current that represents the radio signal.

[*Continued on page* 47]

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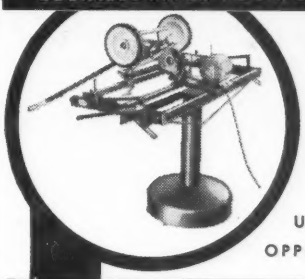

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Earphone Adapter

[*Continued from page* 45]

The easiest way to connect the phones is by means of a plug and a jack. The phones can then be pulled out and put in a drawer when not being used. The jack must be well insulated from the metal chassis of the set.

With the switch in the up position, the output transformer is connected and the loud speaker works in ordinary fashion. If the earphones are plugged in they too will reproduce the program, but the sound will be too strong for persons of normal hearing. With the switch thrown down, the transformer is cut out of the loud speaker circuit, and the resistor serves to complete the necessary circuit through the tube. The programs can then be heard only through the phones. The regular volume control of the receiver is operated to adjust the volume as desired. Two or even three pairs of earphones can be used; the extra ones are merely bridged across the first pair.

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3. Just what is the meson or mesotron?

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The five other atom smashers are: betatron, which accelerates electrons to produce high-energy X-rays; cyclotron, best known among atom smashers, which is a sort of merry-go-round for atomic particles; synchro-cyclotron, which can produce almost unlimited energies by applying frequency modulation principles to the input; linear accelerator, which is an "unrolled cyclotron" and for very high voltage could be 100 feet or more long; and electrostatic accelerator, also known as the Van de Graaff machine, the pioneer atom smasher.

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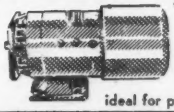

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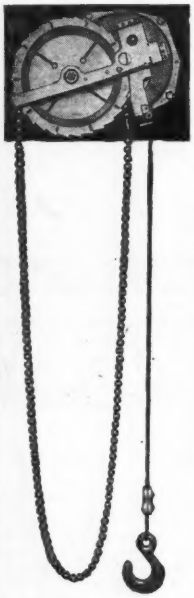

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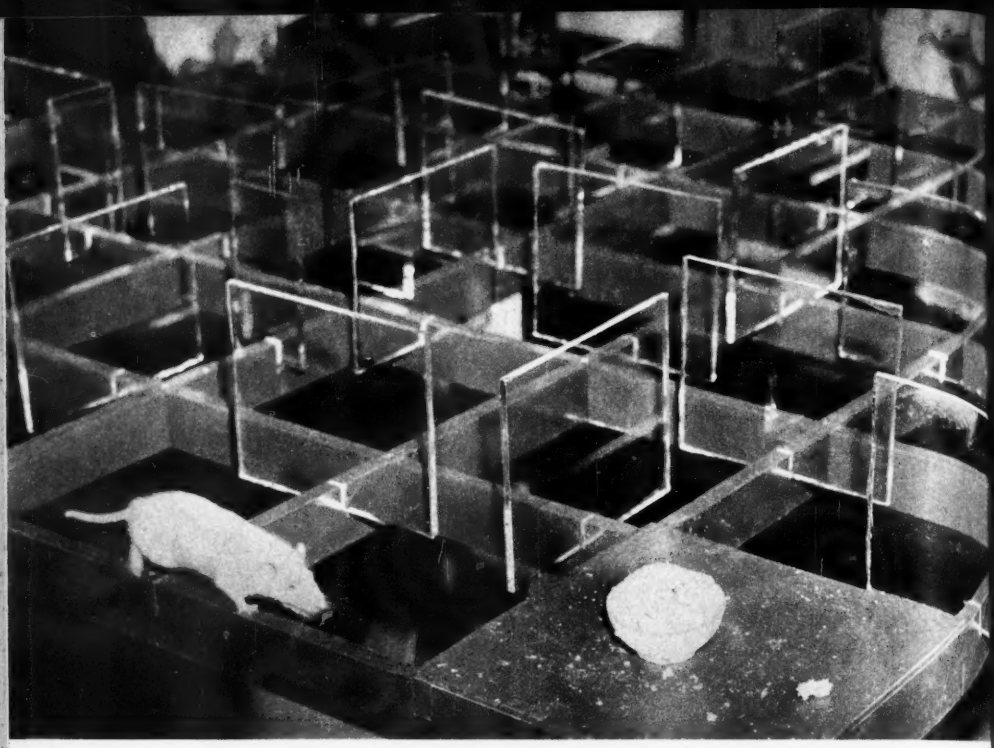
mechanix illustrated
March 1948

Pills That Increase Your Intelligence

BY DONALD G. COOLEY

CAN you feed your brain some special food to make it smarter? Scientists have always laughed at the idea. Now they aren't quite so cocksure. Maybe your brain does have faster speed and quicker getaway when it runs on certain fuels. New scientific discoveries indicate that brain power can be stepped up by swallowing tablets. These pills are not stimulating drugs but concentrates of a food element you eat every day. Let's look into the strange story of one particular brain. It wasn't a very good brain. In fact, it belonged to a fourteen-year-old imbecile boy who had an intelligence quotient of 42 (the average I. Q. is 100). Every year the boy grew twelve months older, but his mental age increased only four and a half months. He kept running an intelligence deficit. Then he was fed little white pills, a dozen



Rats, when fed glutamic acid, can solve more intricate maze problems such as this glass "obstacle course."

and a half daily. Within two months his mental age leaped ahead one year and five months. Sixty days on brain pills and his mental age increased as much as it had in the last five years!

The food for thought that the boy consumed contained a single ingredient: glutamic acid.

You probably took some glutamic acid yourself the last time you ate. You're made of what you eat, and, except for water, fat and minerals, you're mostly protein. Now, protein molecules are immensely complex, but they consist of infinitely varied combinations of some two dozen simpler substances known as amino acids. Glutamic acid is one of these. You obtain it as such from foods. But your body also can manufacture it, by breaking down and reassembling other amino acids. Thus, it is not considered indispensable. Yet it seems to have a surprising capacity for enabling brain tissue to hit on all cylinders.

The case of the brightened imbecile would prove little if it stood as an isolated testimonial to glutamic acid. However, there are others. The boy was a patient of Dr. Kathryn Albert, who tried glutamic acid on eight mentally deficient persons, aged six to twenty-six, but with mental ages of two to eight years, and IQ's as low as 22. All but one of them perked up mentally.

Dr. Tracy J. Putnam, a specialist in epilepsy, made one of the early reports on glutamic acid. He and his co-workers hoped that the chemical would reduce epileptic seizures. It didn't. But there was a totally unexpected byproduct. The patients brightened up, mentally and physically. They were easier to get along with, more persistent in tackling problems.

Later, nine epileptics, two of whom were mentally retarded, were fed glutamic acid. Seven of them showed mental improvement so marked that after six months on glutamic acid, the average IQ increase was nine points. This astounds psychologists, who had believed intelligence is as unalterable as fingerprints.

Science is still seeking the full answer. But it does know that glutamic acid is the only amino acid that can be oxidized directly by brain tissue. To this extent it is a specific brain food. The theory is that glutamic acid increases the rate at which acetylcholine, a powerful chemical essential for nerve activity, is formed. And nerve

activity, as far as the brain is concerned, is a synonym for thought.

The brain-power properties of glutamic acid are newly discovered, but the stuff itself has been known for a long time. Indeed, one of its salts is rather widely used as a condiment in some regions, because of its agreeable meat-like flavor. The acid got its name back in 1866 when it was isolated from the gluten of wheat. Animals grow just as well whether glutamic acid is provided in dietary protein or not. Its booster role for the brain, however, is emphasized by the fact that when patients cease to take it they drop back to their former intellectual level.

Because glutamic acid is a normal food element, and is even made in the body, it is not a foreign agent. Caffein stimulates the nervous system. So do various "pep pills" containing synthetic drugs. But they work in a very different way from glutamic acid. And there is no evidence that they give a long-term lift to the intelligence, however beneficial they may be temporarily.

The main sources of "brain medicine" in your daily diet are bread, eggs and milk. But careful—these foods are fattening!

Are people who tend to be dullish suffering from a dietary deficiency of glutamic acid? Or are their bodies incapable of making it fast enough?

Rat brains are not too unlike human brains in structure. F. A. Zimmerman and his associates placed a large number of intelligent, healthy rats on a diet providing all known nutritional essentials. Half the group, however, received supplements of glutamic acid. To test a rat's intelligence, the rat is put at one end of a maze of blind alleys to see how long it takes it to reach food at the other end. The number of errors and the time required to eliminate false turns show the rat's ability to learn.

The glutamized rats won hands down in tests against their mates which otherwise existed upon the same diet. They were definitely smarter. Similar results were recorded by Dr. Albert in rats forced to think their way around hazards in problem boxes.

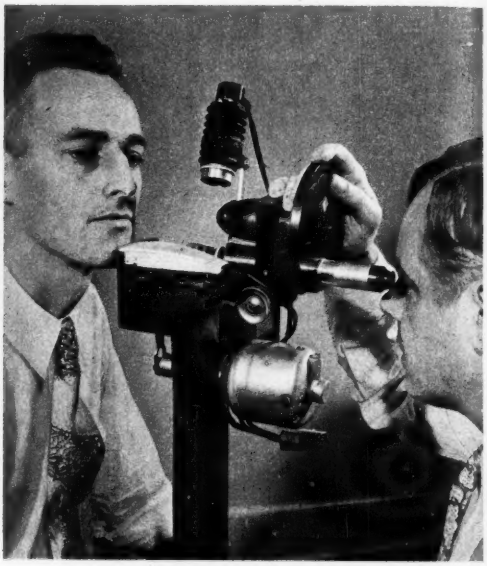
These experiments clearly suggest that glutamic acid has a specific ability to improve brain function. Zimmerman's rats were bright enough, as rats go, which is pretty bright. But on glutamic acid they became super-smart. We're all smarter than we act, in that nobody fully uses his native brain power. Even if glutamic acid does not give us new intellectual tools, it does sharpen the ones we already have.

Just how does glutamic acid quicken the brain? There is no neat answer yet, but a good case can be made for dietary deficiency. School children, on the whole, are keener when given extra milk feedings. Milk protein (casein) is an especially rich source of glutamic acid. The greater mental alertness of milk-fed students might be laid not to the milk itself but to its generous dosage of glutamic acid.

Other outstanding sources for this brain food are wheat flour, egg white, and the protein of corn. Glutamic acid still can't be bought like aspirin. You can insure a good intake with these foods, which also are high in other nutritional values. How much milk would you have to drink to obtain a dosage of glutamic acid equal to the supplements that boosted IQ's ten points or so in the cases previously noted? Three to four pints would suffice—too much liquid for the average person, but a couple of poached eggs on toast, topped off with a glass of milk, would be a nice glutamic start for a brainy day.

We have been [*Continued on page* 166]

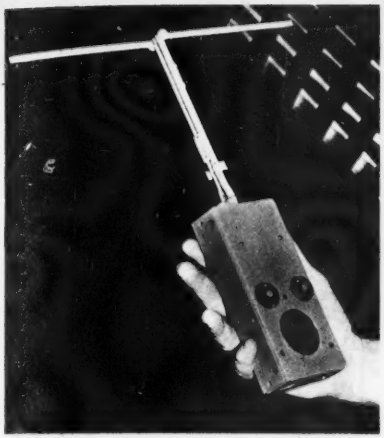
"Don't Run Me Down!" signals Scotchlite, a reflecting fabric that glows when light is beamed on it. The new material can be affixed to any article of clothing as a safeguard against accidents on dark roads or streets. The girl is modeling a raincoat trimmed with it.



Beards Work Hard at the Schick electric shaver plant —and the research engineers bring in their own new crop every day. This stroboscopic device "stops" the shaving head, allowing close study of its shearing action.

Baseball Batty is the unique fence at the home of Bob Trocolor, former backfield star for the New York Giants' pro footballers, now Director of Athletics at Bergen College and scout for the baseball Giants. The fence is composed of bats used by Giant players. Bob hopes to get enough to enclose his entire house.

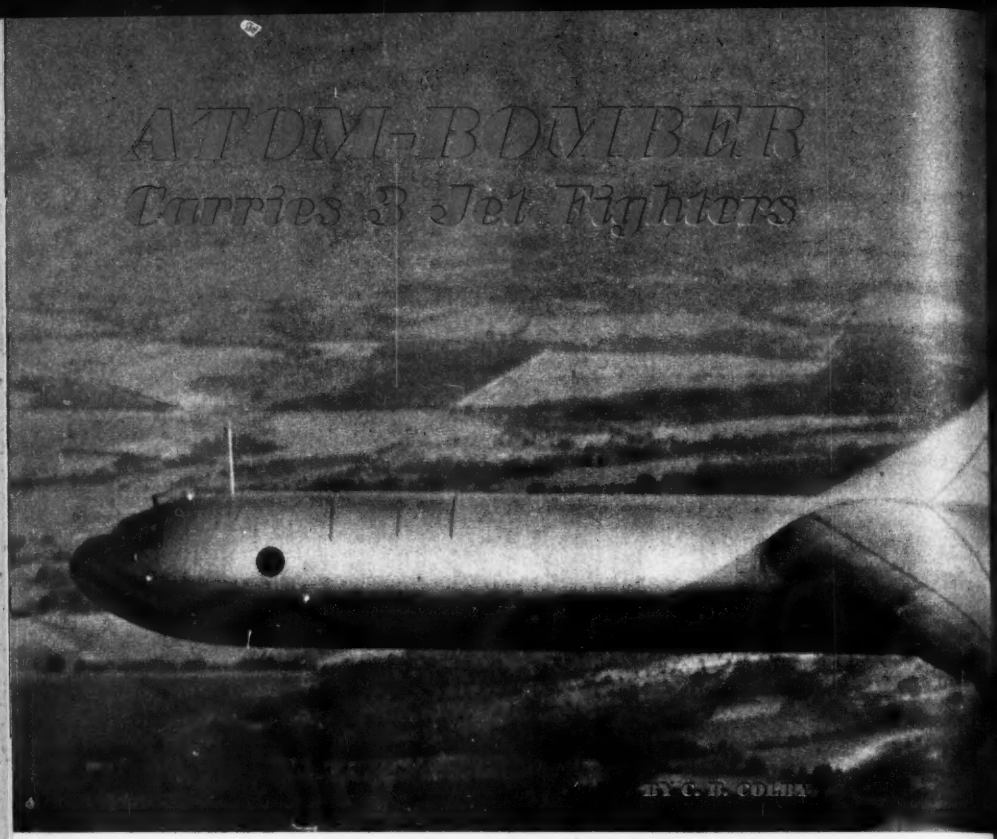
Stocking Raincoat dreamed up by Cleo Kotakis is wonderful for preventing rain from soaking up through open-toed shoes. Ducky (that's what they call it) is clear plastic, held in place by a circle of elastic.

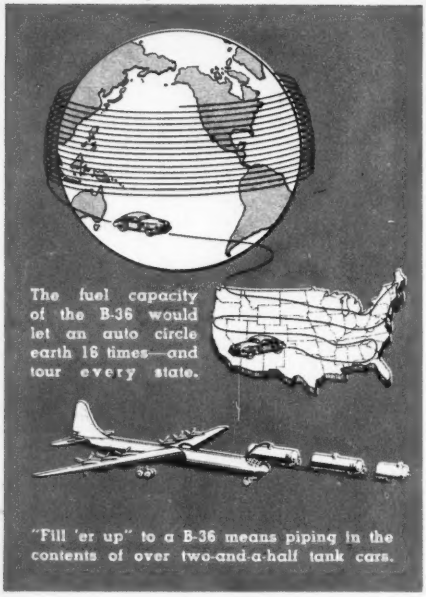


Walk and Talk sets get smaller and smaller. Here's one that weighs only 11 ounces, soon to be put out in pairs for about $200. They'll be tuned to their own private frequency.

Glass Boat sounds like nothing you'd care to cruise over deep water in—but this gas-powered one is quite safe and carries three people comfortably. It is made of Fiberglas.

Window Washer scoots along train spraying water on its windows and scrubbing them with a revolving brush. It handles both sides of a 12-car streamliner in eight minutes.





Meet the B-36. Its wing span is twice the distance of the Wright Brothers' first flight at Kittyhawk. It's 3 times as lethal as the B-29 and can hop to any spot on earth.

THE U. S. Air Force has a "Sunday punch" ready to slug any enemy who tries to start World War III with another Pearl Harbor.

It's a sleek super-dreadnaught of the skies, the Consolidated Vultee B-36 long range bomber—and it's ready today to exploit to the fullest the awesome power of the atomic bomb. Carrying its own fighter protection in its belly, it will serve, in the event of war, as the "throwing arm" for the most destructive force in history.

The new air giant dwarfs even the mighty B-29 Superforts of World War II, in both size and performance. And it's a space shrinker. It should dampen the war-

We get a slight idea of the size of the new colossus of the skies when we see it alongside its 66-foot predecessor, the C-87 Liberator.

The production model of the B-36 carries eight 56-inch wheels to distribute its 278,000 lbs. at landing. Early models had 2 110-inch wheels.

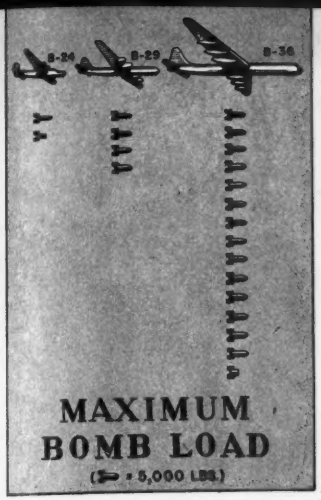
ring ambitions of aggressive nations anywhere in the world.

Brigadier-General Roger Ramey, commanding officer of the Eighth Air Force, soon to become the most powerful air unit in the world through acquisition of a fleet of B-36's, says this about their performance:

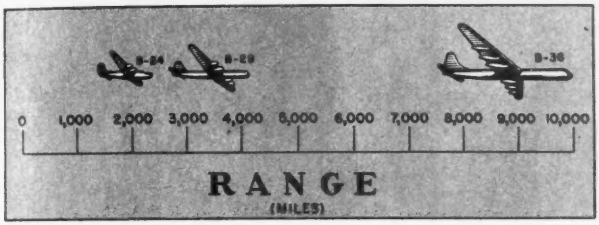
"From the North American continent, they can strike anywhere in the world where aggression against us could start."

The bomber is so designed that "there is nowhere in the world that can't be bombed" from North America, according to General Ramey, "when combat

The mammouth bomber carries her own "parasite" fighters. The bomb bay will hold three McDonnell XP-85's, 15-foot jet fighters with a top speed of better than 650 mph and a ceiling above 45,000 feet. These tiny planes have no landing gear! After trans-sonic battle they return and latch on to the mother ship with their "sky hooks," as seen in the picture. The wings can fold up for compact storage.



Some of the multitude of instruments which the flight engineer has to shepherd!



Charts show the B-36 far in front. It can carry 72,000 pounds. It can deliver a five-ton bomb load 8,000 miles away, then return.

operations are considered in the light of possible shuttle bombing."

The B-36 has a four-section bomb-bay whose total space equals that of four railroad freight cars. It can fly 8,000 miles at nearly 400 mph with a bomb load of five tons —and fly home. For closer targets it carries 36 tons of blockbusters.

In terms of a fighting army, the huge craft can carry 400 fully armed men to any battlefield on earth.

The extent to which the new atom-bomber outclasses even its vaunted predecessor, the B-29, is most obvious in a physical comparison. Its fuselage, for example, is two-thirds longer than that of the World War II Superfort—163 feet compared to 99 feet.

The B-36's 230-foot wing span is almost twice that of the B-29—nearly double the length of the Wright Brothers' first flight. The basic weight of the B-29 is 78,000 pounds; the B-36, 130,000 pounds. On one flight, the B-36 took off with a gross load of 278,000 pounds (139 tons), the heaviest load ever lifted from the earth by an aircraft.

The giant wing of the B-36, swept back along the leading edge, covers an area of almost 5,000 square feet. Six pusher-type Pratt and Whitney engines, mounted along the trailing edge, develop a total of 18,000 hp. [*Continued on page* 93]

Crewman entering the plane's 85-foot communications tunnel. He'll lie flat on that four-wheel cart and scoot from one end to the other by pulling on an overhead rope. (Rumor says the pilot gets a lot of requests to climb or dive—to zip up the ride!

Has Russia the Atom Bomb?

BY HANSON W. BALDWIN
Military Analyst, New York Times;
Graduate, U. S. Naval Academy

DOES Russia have the atom bomb?

Soviet Foreign Minister Molotoff and his mouthpiece Vishinsky have stated that the Russians know the "secret" of the bomb.

They undoubtedly do, but that does not mean that Russia has been able to build a bomb. In my opinion they have not produced an atomic bomb to date of writing—but they will. Intelligence information—unofficial and inconclusive but indicative—says "no bomb yet."

Our own experience in manu- [*Continued on page* 62]

SOVIET ATOM BOMB might have been tested somewhere in Siberia—perhaps in the crater of the great 1908 meteorite. Foreign Minister Molotoff says Russia knows the secret of the atom bomb.

Vishinsky, Molotoff's deputy, rails against U. S. and hints we have no monopoly on atomic bombs.

facturing and producing atomic bombs also supports this conclusion.

There is no real scientific secret to the atomic bomb. There has been no such secret since before the war, certainly none since Hiroshima proved theory practical. Therefore Molotoff's statement that Russia "knows the secret" is a simple propaganda device.

There are, however, a great many technical and engineering and production secrets—hundreds of them. Even the relatively simple Hanford plutonium plant required in its construction the services of hundreds of subcontractors. This one plant required a cross section of American industry, and devices hitherto unknown to man. Production "know-how," industrial genius and technical and mechanical ability are not an American monopoly. But no other nation possesses these attributes to the same extent that we do. Industrially, Russia is still a backward nation compared to us.

There are other factors which limit Russia's atomic capabilities. One—though less important than it once appeared—is power. Most of the world's great power plants are in North America. Another is availability of raw materials, particularly of the primary material — uranium. Russia has enough to produce a small number of bombs, but her limited stockpile of uranium ore is inadequate for any large number. By far the greater part of the world's *known* sources of uranium—including the rich resources of the Belgian Congo—are available to us, but not to Russia.

All these things mean to our keenest observers that Russia does not have *a* bomb today. She probably has completed, or is about to complete, however, one or more small atomic piles. Best estimates of her "A-Day"—the day when she will get her first experimental bomb—range between 1950 and 1957. Some few think it will take her longer than this. Majority opinion indicates that the United States will retain its quantitative lead in bomb production for a very considerable period—perhaps

Red Army parades its manpower before the Kremlin. But does Stalin have an atom bomb up his sleeve?

Is Russia hiding an atom-bomb factory, such as ours at Oak Ridge, in some far corner of Siberia?

until the 1960's or 1970's, perhaps indefinitely—and that it will take Russia a decade or more to acquire a stockpile of even a score or two of bombs.

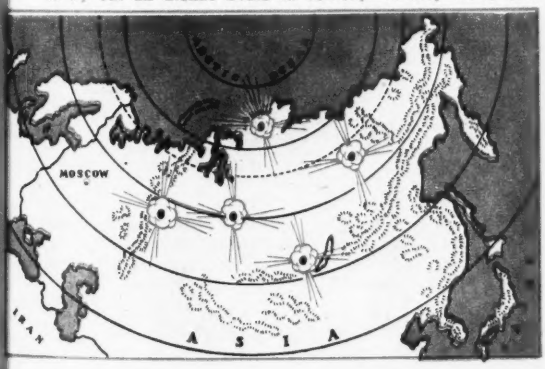
When Russia gets her first bomb, can we tell?

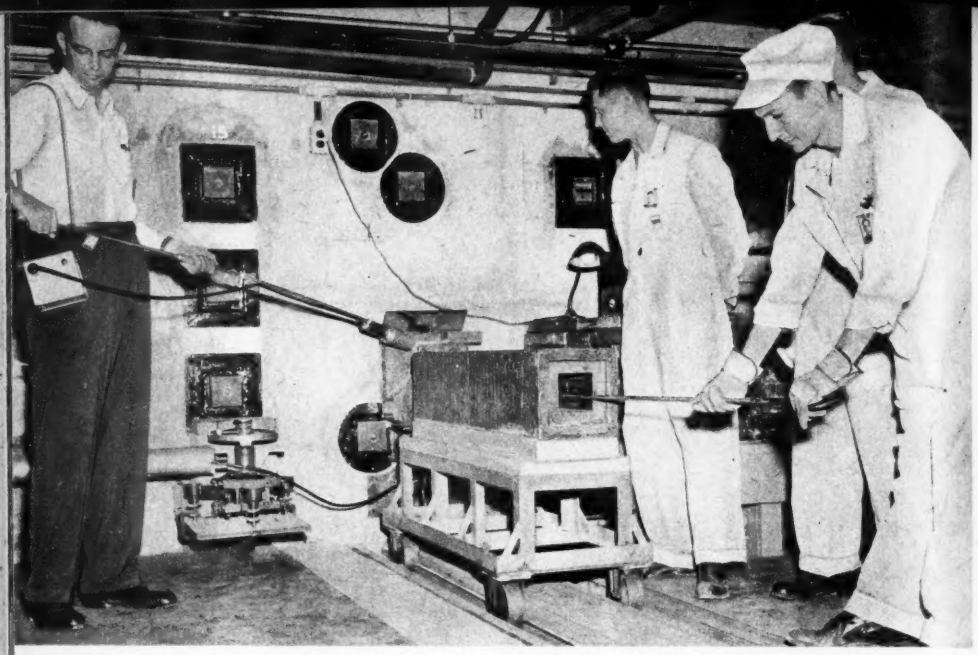
The nature of the atomic bomb is such that a nation trying to manufacture it for the first time cannot be sure of success unless a test bomb is exploded. She is likely to choose a rather remote area for this test. She will probably choose somewhere in Siberia or in the midst of the Eurasian "heartland," or perhaps in the Arctic area far from border observation. She can almost certainly prevent visual evidence of the test leaking to the outside world.

Contrary to general impression no seismograph in the world is sensitive enough to record an atomic explosion, unless it is within 200 or 300 miles of the blast. The force of an atomic explosion is minute com-

Atom research chemist has to be careful when he lifts this bottle from its container. There's a death ray inside.

Here are five likely spots where the Russians might seek to try out an atomic bomb in secrecy—if they make one.





Lead coffin on wheels must be used to take "hot" sample from radioactive cell at Oak Ridge lab.

pared to even a mild earth tremor, and very little of the bomb's explosive force is transmitted to the earth's crust.

The microbarograph, an instrument which records small changes in air pressure, is probably as useless as the seismograph for this purpose. At great distances from the scene of the explosion it would show nothing.

Electroscopes, which measure radioactivity in the atmosphere, seem to offer more promise. The radioactive fission products from a test bomb would be caught up in the air currents, might be carried in the upper atmosphere for thousands of miles and perhaps could be measurable outside the borders of Russia. But these particles are dissipated rapidly and the vagaries of air currents make the utility of electroscopes as detecting devices completely unpredictable.

We shall not be able to tell, therefore, as soon as Russia's first atomic bomb is exploded—unless Russia wants us to know. But we shall know *after a time lag* when Russia has the bomb. Secrets of this nature cannot be kept forever. The amount of uranium and other raw materials required, some of which must come from outside Russia's borders, and the great size of the physical installations necessary will, in time, reveal her possession of the bomb.

Are we helping Russia get the bomb?

We have been exporting small amounts of machinery, industrial and transportation equipment and manufactured goods to Russia since the war. These exports undoubtedly strengthen a little the vast and complicated industrial establishment that must be behind any production of the atomic bomb. We have also allowed the Russians to learn and "export" some of our general production and technical "know-how"—mass production techniques, factory management. [*Continued on page* 89]

Wall of lead bricks and looping tongs help protect this atomic lab aide from "semi-hot" sample.

Toss-Bombing

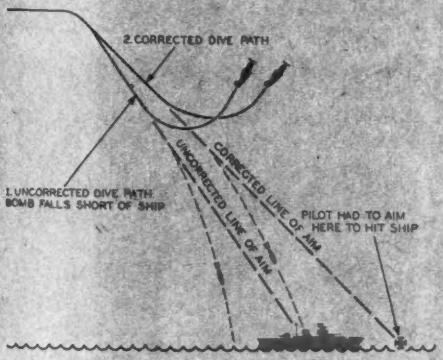
THE United States Navy—always right in there pitching—has started tossing. Toss-bombing, that is. But don't for a second think that means the bombs will fall less accurately. Pin-point precision is the objective more than ever.

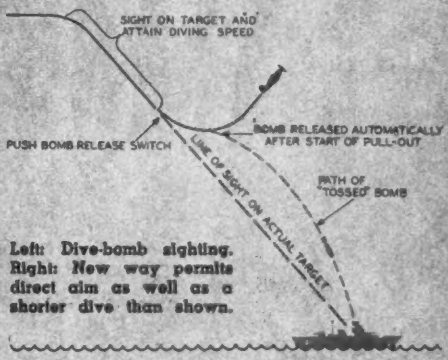
Dive-bombing has been simple in principle but mighty difficult in accurate execution. The bombs, slung beneath the fuselage or wings of the aircraft, were released after being directed at the target by the pilot's aiming the entire ship and bombs as a unit.

After peeling off for the dive the pilot lined up his aircraft's nose on the target below and held his course until he was as low as nerve and enemy anti-aircraft fire would permit, then, *after* releasing his bombs, he would start his pull-out and try for a get away.

Gravity and air resistance were always on the enemy's side, with the result that our Navy pilot had to "over aim" his bombs so that by the time gravity and air resistance had finished with them they were still on the target and not far short of it.

The result of this was that the pilots had to memorize a long list of sighting allowances and adhere strictly to a pre-planned dive angle, speed, and release point. More the miracle that our Navy pilots made such records for pin-point dive [*Continued on page* 92]

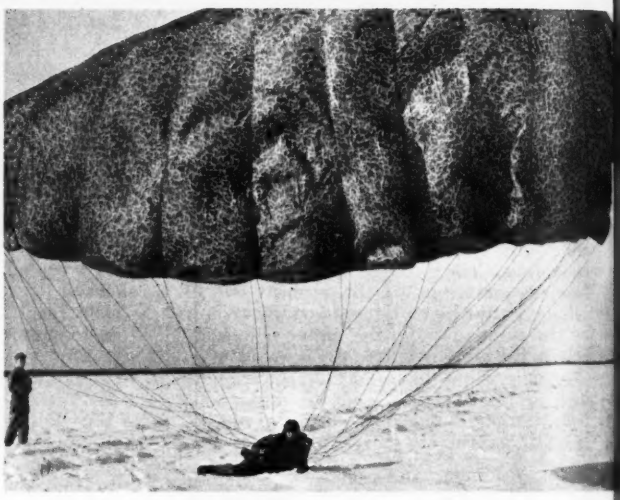




Left: Dive-bomb sighting. Right: New way permits direct aim as well as a shorter dive than shown.

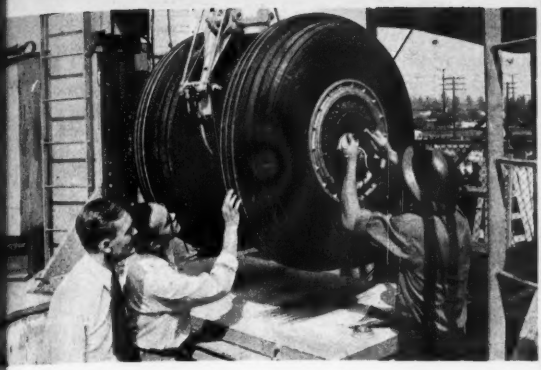
New In the Sky

Skyrocket D-558-2, the new jet- and rocket-powered experimental trans-sonic plane. Its rockets will furnish extra push during speed runs.



Snow Fall at end of parachute jump made during the Army's "Exercise Snowdrop"—part of maneuvers designed to test techniques over snow-covered ground.

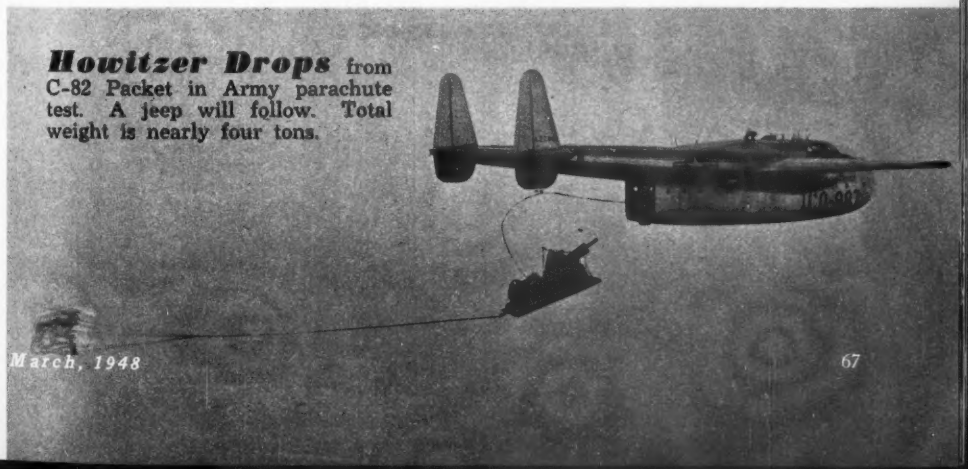
Pioneer, the new three-engine passenger-cargo transport, by Northrop, wings aloft on its maiden flight. It can take off with five tons of useful load in only 700 feet.



Landing Gear Test Rig at Lockheed's drops plane tires on a "floating" concrete platform. Tires spinning at 100 mph stop dead in one-tenth of a second. See the smoke?

Radar Warning Device for lightplanes which tells the pilot when he is within 2,000 feet of ground, mountains or buildings, weighs 16 pounds.

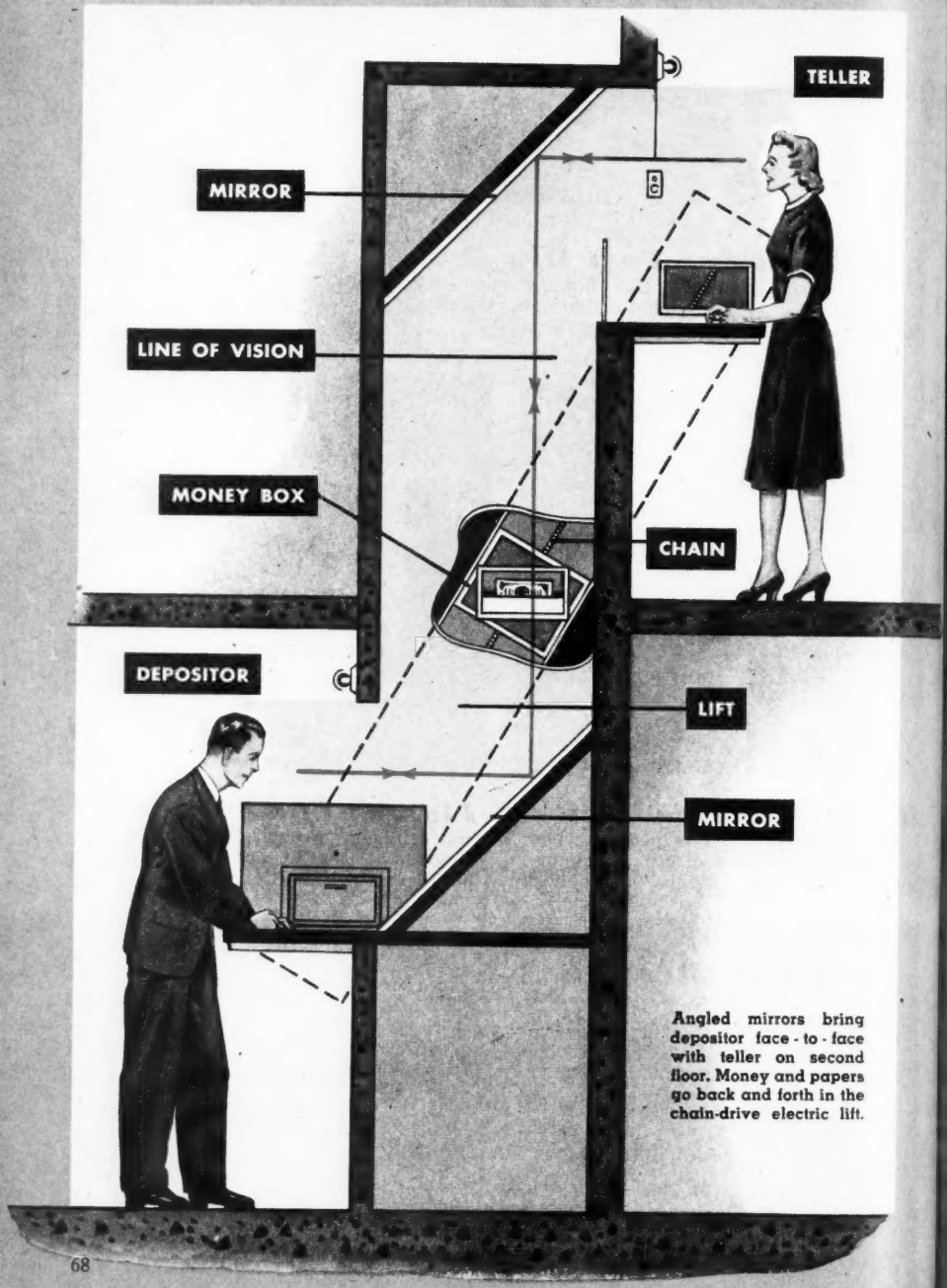
Flames Can't Burn the man's fingers through the quarter-inch paneling of fire-resistant steel and plastic just developed for use in aircraft.



Howitzer Drops from C-82 Packet in Army parachute test. A jeep will follow. Total weight is nearly four tons.

Garden City, L. I.

Bank Does It With Mirrors



Angled mirrors bring depositor face-to-face with teller on second floor. Money and papers go back and forth in the chain-drive electric lift.

THE submarine periscope has gone into the banking business. It's all done with mirrors, as a look into the Garden City Bank and Trust Company of Garden City, L. I., would show you.

To save valuable space on the ground floor, the bank set up its note department on the second floor. Patrons, however, still do their banking on the main floor, thanks to a periscope channel built into the wall. The patron simply walks over to the table at the base of the periscope channel and sees the teller in the large 45-degree-angle mirror before him. Both teller and patron discuss the business at hand just as if they were facing each other through a cash window, since normal tones carry clearly up and down the channel.

The teller upstairs pushes a button near the top opening of the chain-drive elevator and, presto! the money box flies up the shaft to her. She handles the patron's business as usual, then returns the receipts or money down the elevator.

The idea for this novel banking by mirrors goes back to the wartime shipbuilding boom at Portsmouth, Va. Frank Lawrence, president of the American National Bank there, had to handle in his modest-sized bank millions of dollars every week in shipbuilders' paychecks.

He filled up all his ground-floor space with teller windows, but still the bank's customers queued up like movie fans on Saturday night and even jammed the sidewalk. After working out a unique solution with A. Stanley Miller and Sons, a father-son architectural firm, Lawrence gave his bank customers a cash window right on the curb.

The customer drives up to the side of the bank, then, without getting out of his car, presses a button for his curb-service banking. The teller is actually down in the basement, but the customer sees her reflection face-to-face through a mirrored passage similar to the one shown here.

A. Stanley Miller, Jr., of Mineola, L. I., who helped his father plan the Portsmouth cash-on-the-curb system, adopted the mirror idea for the Garden City Bank, where the customer comes inside the bank but has to deal with the teller upstairs.

Not only does banking with mirrors save the feet and the bank's space, but it makes the cash cage safer, for even big-time bandits haven't learned how to shoot around corners. Mirrors thus are making banking easier for everybody but the bank robber. One problem, however, is still tough: How are you going to dig up enough green stuff to keep the money box full? You still can't do that with mirrors. •

Teller sees the patron as if he were standing at the other end of a tunnel through a thick wall.

Money elevator is operated by two buttons on teller's right. Below: how patron sees teller.

IT'S A GRAND FEELING, TO BUILD A WINNER

Mr. Robert Brightman, photography editor of Mechanix Illustrated, is shown displaying Walter A. Musciano's splendid 32-inch control line model of the plane that Frank Hawks flew to fame in 1930. It has won two first prizes so far.

IT'S A GRAND FEELING, TOO, WHEN YOUR CAR IS CUSHIONED WITH MARFAK CHASSIS LUBRICATION

THAT CUSHIONY FEELING LASTS LONGER WITH MARFAK!

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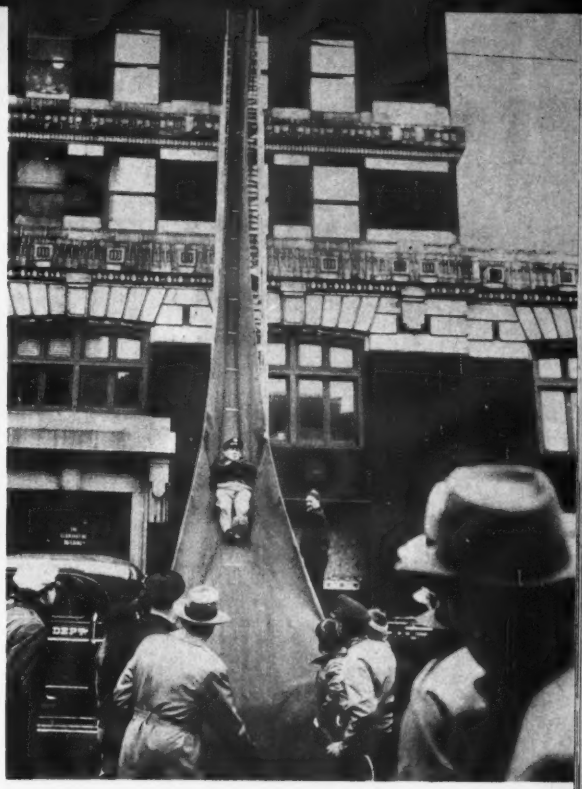
THE TEXAS COMPANY

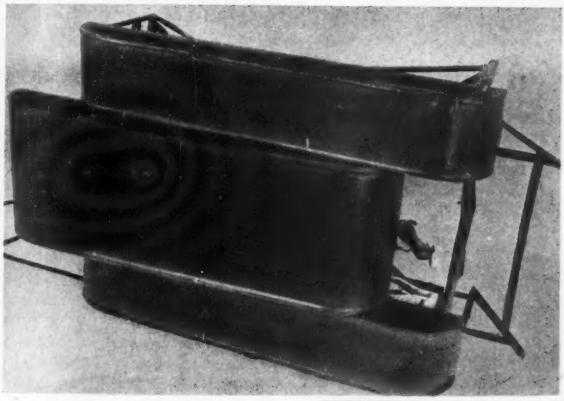
TEXACO DEALERS IN ALL 48 STATES

Tune in: TEXACO STAR THEATER presents the TONY MARTIN show featuring Alan Young every Sunday night. METROPOLITAN OPERA broadcasts every Saturday afternoon. See newspaper for time and station.

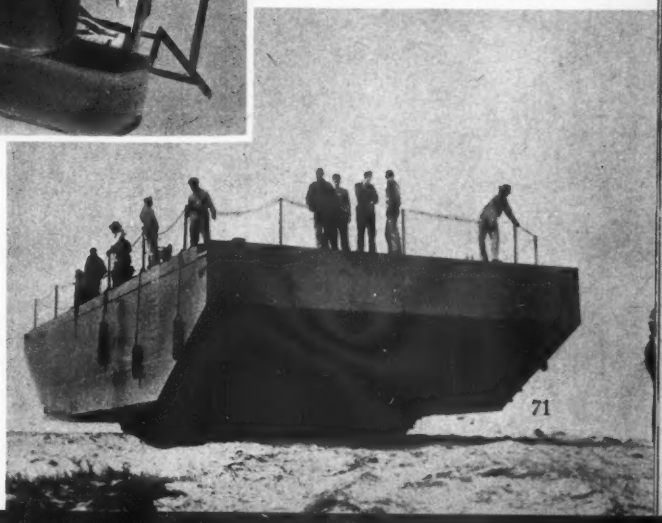
Seeing Pencil may enable the blind to read by hearing. Run along a line of text, its stylus sends out a beam of light which is converted into sounds that are different for each letter encountered.



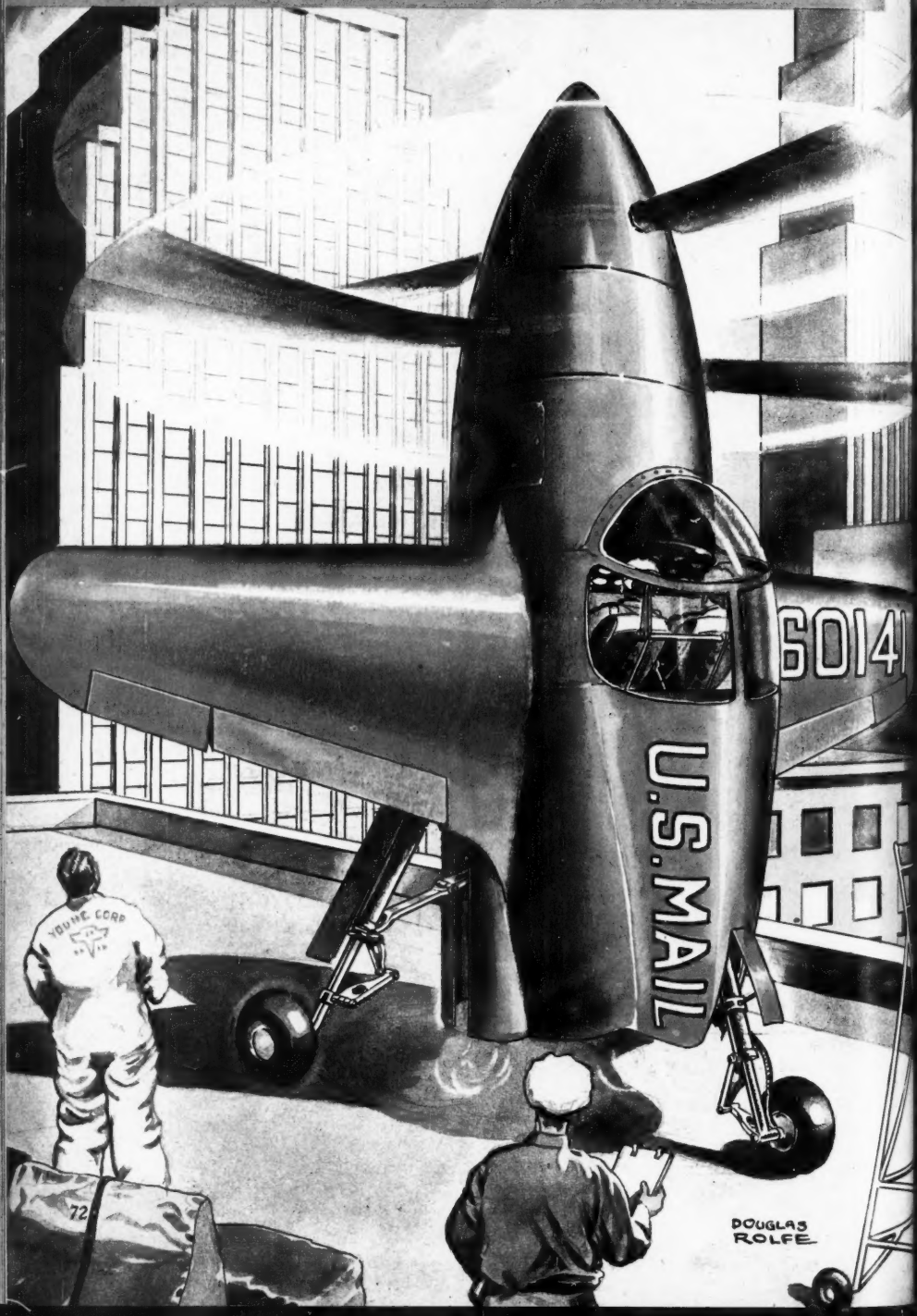
Escape Chute of canvas, recently demonstrated by smoke-eaters of Cleveland, gives easy exit to persons trapped in a burning building. It can be raised nine stories. Fire Chief J. E. Granger recommended buying several.

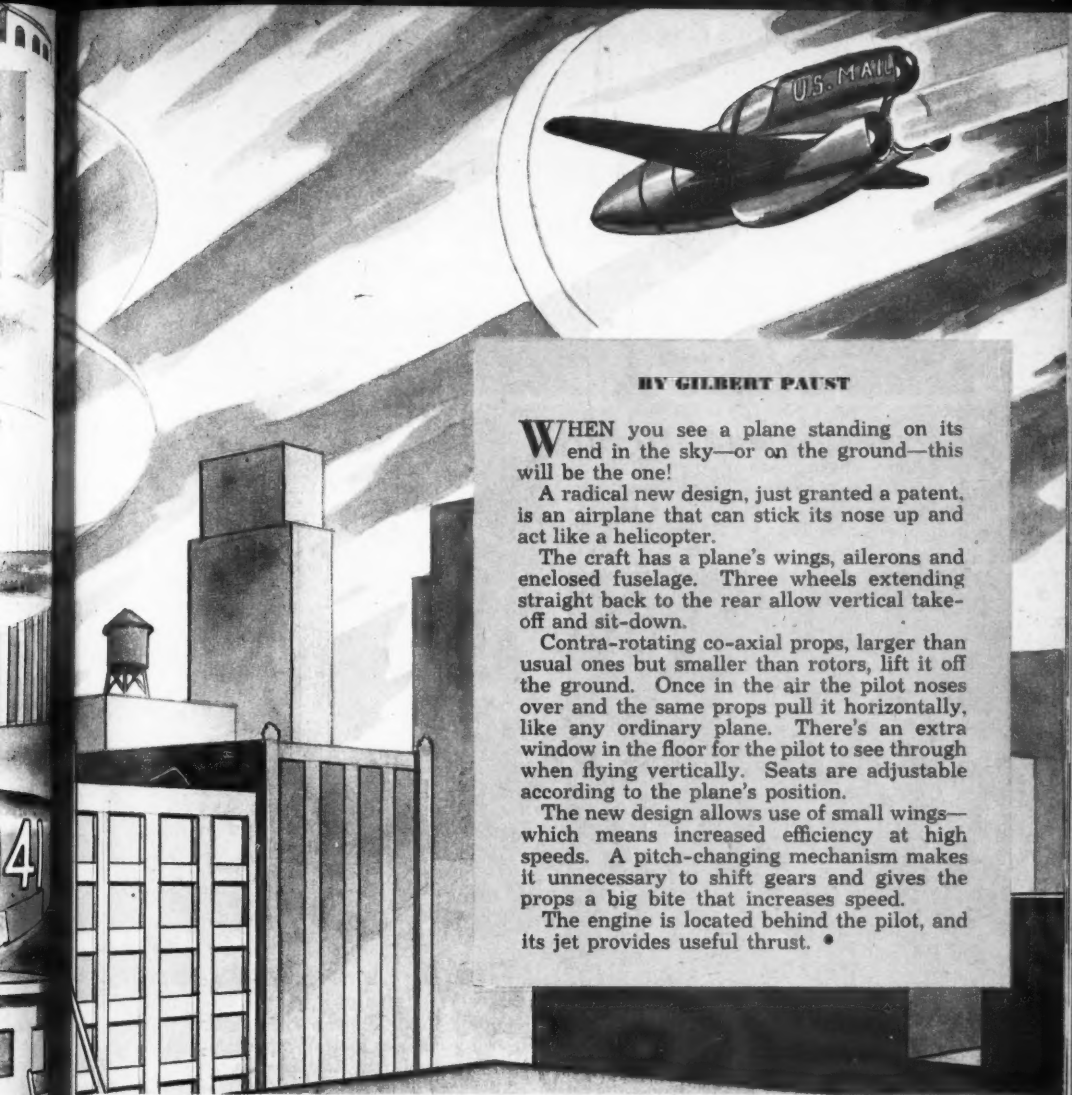


Walking Barge of U. S. Navy propels 60 tons of men and supplies over anything, conquering surf, soft mud, sand and quagmires. It is propeller-driven in water; its pontoons hump it along froglike over ground.



Convertible Jet Helicopter





BY GILBERT PAUST

WHEN you see a plane standing on its end in the sky—or on the ground—this will be the one!

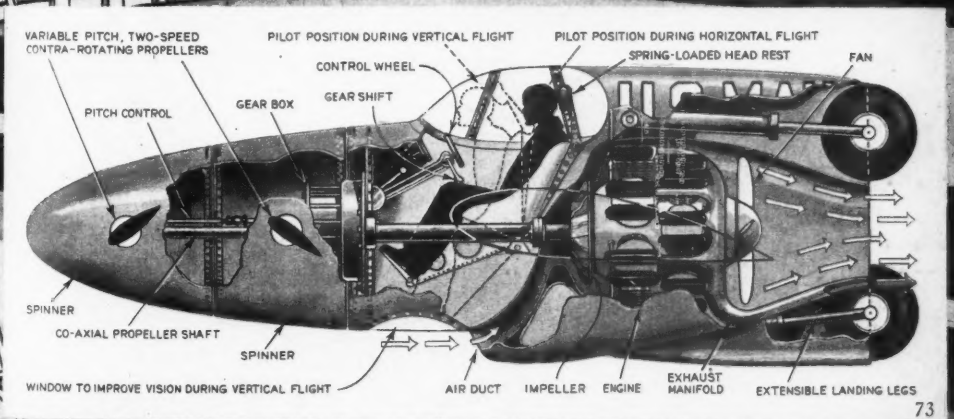
A radical new design, just granted a patent, is an airplane that can stick its nose up and act like a helicopter.

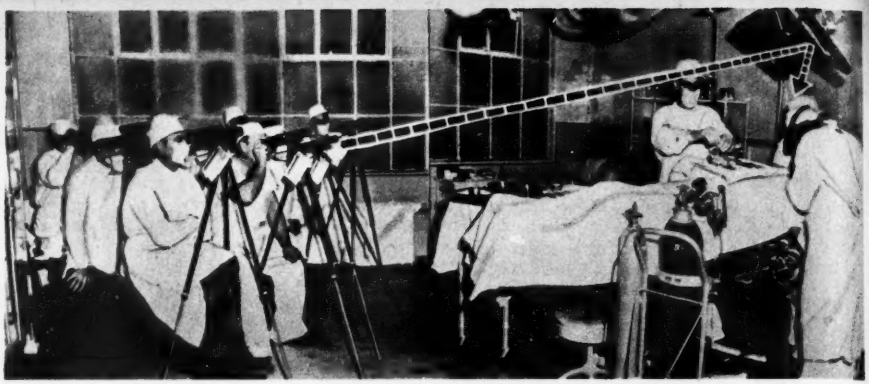
The craft has a plane's wings, ailerons and enclosed fuselage. Three wheels extending straight back to the rear allow vertical take-off and sit-down.

Contra-rotating co-axial props, larger than usual ones but smaller than rotors, lift it off the ground. Once in the air the pilot noses over and the same props pull it horizontally, like any ordinary plane. There's an extra window in the floor for the pilot to see through when flying vertically. Seats are adjustable according to the plane's position.

The new design allows use of small wings—which means increased efficiency at high speeds. A pitch-changing mechanism makes it unnecessary to shift gears and gives the props a big bite that increases speed.

The engine is located behind the pilot, and its jet provides useful thrust. •





Telescopes and Mirror give many eyes a close-up view of a delicate cataract operation which heretofore could be observed by only one or two. It happened in Doctors' Hospital, L. A.

Giant Vacuum Cleaner Largest one ever assembled is this 196-pound jumbo made for exhibition purposes. It takes a bit of pushing, but works fine according to Henry Hoover.

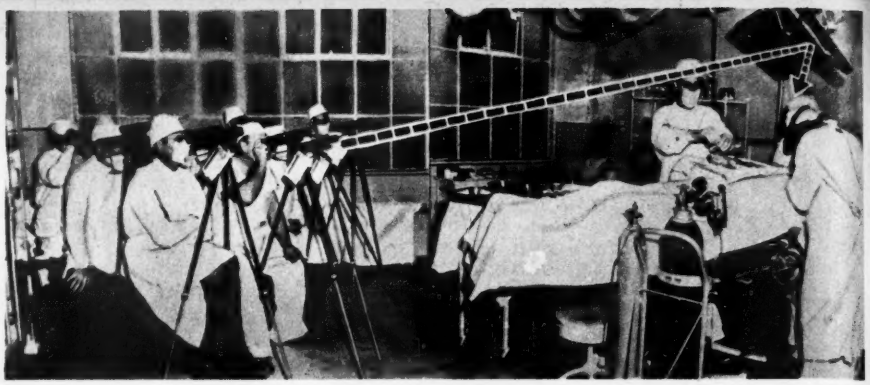
One Big Blow inflates this non-sinkable swimming suit enough to keep the girl afloat for many hours. When uninflated, the suit looks like any other, the tube being concealed when not in use.

AMBULANCE RADIO controls traffic

AMBULANCES are supposed to speed people to hospitals—but they *can't* speed and they therefore can't save some lives.

Traffic holds them back. Their average 35 mph is pretty slow.

But they may do 70 before long. A device now being patented by J. R. Schwarzkopf will put a radio transmitter in the ambulance. Traffic lights will contain tuned receivers with relays. The ambulance will streak along, its radio signalling—and all the lights will turn red and all traffic pull over to clear an open speedway. •



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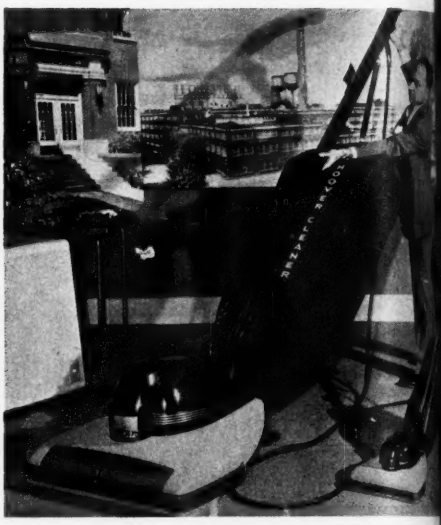

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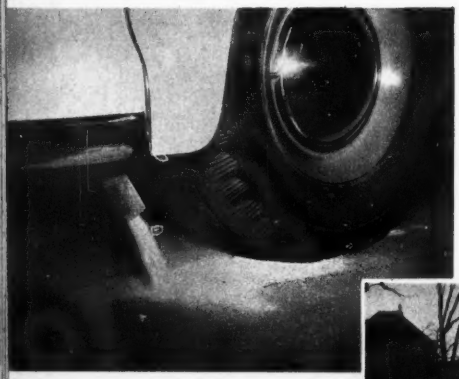
A wet pavement—and three people are killed when their car skids on the Golden Gate Bridge, San Francisco.

Make Your Car *Skidproof*



Sand never misses tires—the tubes put it exactly where they meet the road.

ONE man who doesn't want to skid from this world to the next has fixed up his car so it won't happen. You can, too.

Jack C. Deagan, of Chicago, puts sand on the road, exactly where each rear tire makes contact. He carries his sand in a small tank in the luggage compartment—enough for 100 emergency stops. An air-pressure system guarantees the sand's exit. To stop, he brakes with his right foot and at the same time presses a floorboard pedal-valve with his left. •

Mr. Deagan notes a perfect result. Those lines mean a quick stop on rain or ice.

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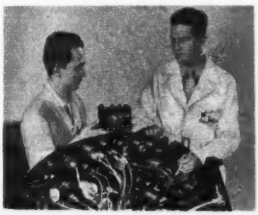

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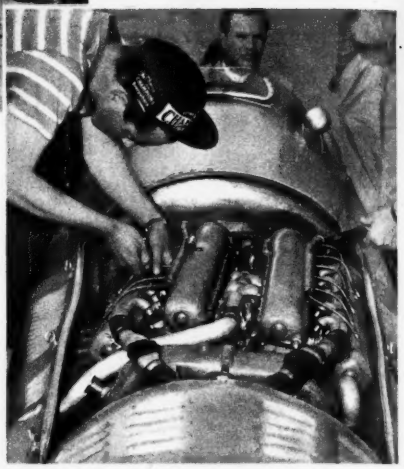
SEND COUPON TODAY

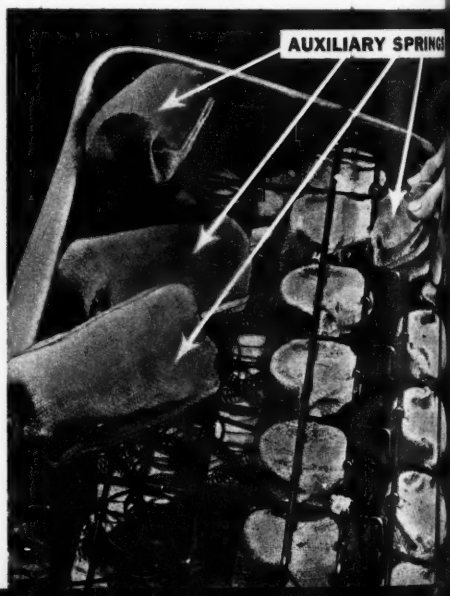
New on the Road

Engine Rests Crooked in this Mercedes Benz, a top candidate to squash the track record at Indianapolis this year. Its in-line connection to an off-center rear axle assembly adds power and gives extreme underslinging.



Squirming Irma is not the girl in the picture (who is Randee Sanford and always sits quietly) but a vigorous gadget for testing Ford springs and upholstery. It acts like a 135-pound woman squirming 11 complete squirms a minute.

Heavy Passengers in 1948 Studebakers (right) needn't sink low in the front seat cushions if they take advantage of a feature which permits easy insertion of extra spring coils between the usual ones. They can ride higher and see better.



Covered Motorcycle is a far cry from the old-time covered wagon. This one, streamlined and aluminum plated, was displayed at the Milan Exposition. Its seat height is adjusted by handle the man is turning.

Strong Finger? Or light bike? It's a light bike, the lightest in the world, according to Legnato, its makers. Enrico Villorese, the Italian auto racing ace, easily holds its nine pounds on his finger tip.

Cache for Liquor in your new Rolls-Royce may be a sliding affair tailored into the back cushion or an eight-bottle bar at your knees. There's not quite room for your private bartender.

MI Tests The '48 HUDSON

Hudson is tops in post-war beauty, roominess and all-round performance, says Tom McCahill, MI's auto expert.

THE 1948 Hudson is now carrying the "new look"—and in other ways, too, it has definitely stepped out front.

Hudson is the second of the old-line companies to break away from the pre-war appearance. Results are startlingly good. Their new model is without doubt the most luxurious car ever offered in what is known as the medium-priced bracket, and it is tops in value.

Outside, the '48 Hudson is low and sleek, but the pay-off comes when you get inside. Never before in a medium-priced American car has there been so much interior luxury and room. The seats are several inches wider than the car's overall five-foot height. The interior appointments and upholstery are genuinely glamorous without being gaudy—and to effect that is a neat trick. The only fault I could find, once inside, was the same one I found with the '46 job, and that is the height of the windshield. The windshield is still further forward from the driver's eyes than in most cars and this makes it seem very narrow from top to bottom. I feel that if it were just a bit closer to the driver, or an inch or two higher, the car would be both safer and more pleasant to drive. Aside from this, everything about the new car struck me as tops.

The '48 Hudsons come with either six- or eight-cylinder engines. The one I tested was the eight. Both cars are identical with the exception of the engines, and a hundred-dollar bill will cover the price difference. The six-cylinder engine has a lot more power than the 1946 job, developing 121 hp. The eight develops 128 hp at 4,200 rpms. This means that it will take quite an automobile to out-perform either.

The eight I tested had the sharp snap of a ringmaster's whip. In traffic it got away from lights fast and smoothly. In high it would whip from 10 to 70 mph in a matter of seconds. On hills it performed with any car in its price range. The eight-cylinder Hudson engine should prove very popular with the road-eaters who make a business of using up one road map after another in cross-country hops.

While this big, fast car is cruising along with the fastest of them, hour after hour, its passengers will enjoy a new club car

We get some idea of the roominess of this very low car when we see Tom, a big man, lost in one corner.

comfort. The car's riding qualities are fine, and its roadability, thanks to the body that's wider than it is high, can't be beaten. If you have ever crossed the prairie or other open country when a strong cross-wind caused your car to snake from ditch to ditch, you will appreciate this new design that squats down close to the road. In my own 1948 car, which still maintains some stage-coach features, I've been blown around the road like a frightened feather.

I can sum up all performance by saying that in the six-cylinder class there isn't a car in the country that will out-perform the Hudson six, and that in the larger eight-cylinder class the Hudson eight will make an excellent showing when pitted against the best.

I feel perhaps a word on how I make these car tests may be of interest here. On nearly all cars tested, stop-watch records are made of the acceleration in all gears. Further performance tests are usually made in high gear over a measured mile, starting at various speeds. Also, whenever possible, climb tests are made and recorded.

Detailed figures are not given in the interest of fairness. For example, when I tested the new Studebaker I was testing a car that already had many thousands of miles on it, which meant a thoroughly broken-in automobile, but the Hudson I just tested had travelled less than 200 miles. Naturally, stop-watch comparison should not be made.

To further exemplify this, last spring I was making a top-speed test on a well-known car that is supposed to be thoroughly broken in when delivered. With 1,200 miles on the speedometer, I held the throttle wide open over a measured mile after a two-minute speed build-up, and clocked it at [*Continued on page* 92]

Look—the car is wider than it is high! But that makes for wonderful roadability.

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a thrilling new Sportwin by EVINRUDE

YEARS AHEAD IN DESIGN • PERFORMANCE •

One glance tells you there's a brilliant new leader in the light motor field . . . one run, *and you know it's true!* You thrill to power that is incredibly smooth, flexible, quiet! You enjoy sparkling new features that give you an entirely new conception of light motor performance, convenience, handling ease! Here is the fuel gauge you've always wanted . . . and a score of other advancements including the amazing *Weedless Drive* that lets you highball through waters closed to other motors . . . gives you the all-clear through thick weeds and over rocks, snags, reefs . . . drives anywhere there is water to float your boat!

See Your Evinrude Dealer! Examine the new Sportwin and the complete Evinrude line for '48. Six great Evinrudes to choose from — three famed four-cylinder models — the right motor for every boat. Look for your dealer's name in your phone book under "Outboard Motors." Write for free catalog — address, EVINRUDE MOTORS, 5703 N. 27th Street, Milwaukee 9, Wis.

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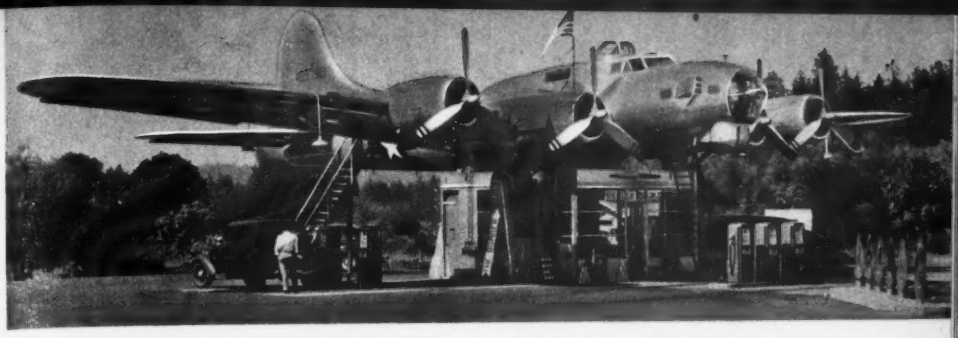
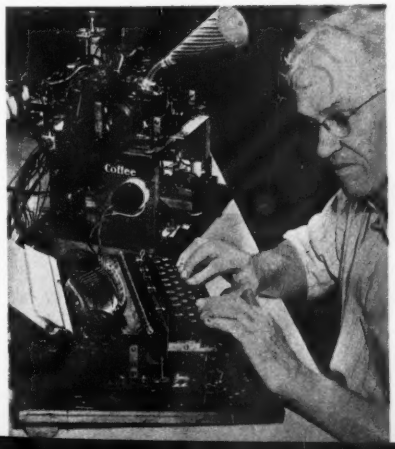


Rooftop Fortress is the real thing, complete with everything but guns and bombsight. Art Lacey, former USAAF pilot, bought and mounted it to serve as an eye-attracting canopy for his Milwaukee, Ore., filling station.

Ski Students get ready for their winter fun by cross-country practice on the hay at Stanford University. Hay's fine to learn on, they say; it's much warmer to sit down on than snow. But it does surprise the grasshoppers!

Chain Maker accepts molten aluminum at one end and gives out finished chain at the other—a continuous process. Model Doris Reynolds, model chain-maker, is demonstrating it at the Metal Congress and Exposition in Chicago. Both were a hit.

Talking Typewriter, the Typovox, speaks up and tells you when you hit the wrong key. Inventor Coffey says it should prove a boon to the blind—and that its principle can be applied to cash registers and adding machines to make them errorless.



MAN EXPLORES NATURE'S MOST DESTRUCTIVE FORCE

It's stronger than 1,000 Atom Bombs

BY JAMES N. MILLER
Based on an interview with Cmdr. Roger Revelle, U.S.N.R., Chief Navy authority on waves

ALWAYS the waves of the sea have been man's enemy, hampering his movements, destroying his property, taking his life. Always they will remain his enemy. But not for much longer will their larger mysteries, their apparent freaks and caprices, remain unknown. Modern charts show that waves have a language. Oceanographers are learning to read it.

Waves can be fearful things.

A man is standing on the water's edge. Near him children are playing with buckets and shovels. Men and women lie basking on the warm sand. Others are frolicking in the little breakers that tumble in from a placid sea.

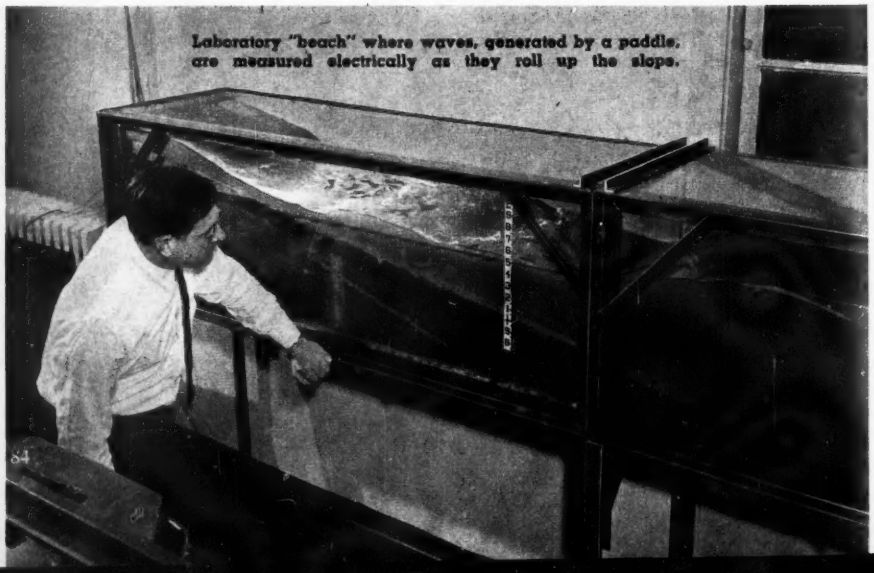
Then tragedy strikes savagely from that placid sea.

Far out, the horizon rises, imperceptibly. No one notices it. A moment later someone cries out and points seaward. A tremendous wall of water is racing toward the bathers. At terrific speed, almost before those who see it can react, it is upon them. It rises over the shelving beach, towers terribly there for just one second. Then all on that peaceful beach, men, women, the little playing children, are caught up in a green wall of death. Twisting, choking and drowning, they are hurled back among the debris of their own seaside cottages. Finally, the great wave spends its force. As it subsides seaward, it sweeps many of its victims back into the depths.

That racing wall of water is a tidal wave. It may appear out of a calm sea, overwhelming, then vanish again, all without warning.

One of the world's greatest tidal wave disasters struck in the Pacific last year, wrecked water fronts, left thousands of people homeless, and swept hundreds out to sea. That disaster was caused by a series of eight underwater earthquakes near Dutch Harbor, seismologists found. So mighty was the force of its waves that they swept all the way to the coast of Chile, 8,000 miles away.

Tidal waves rank with earthquakes and hurricanes as one of nature's most



Laboratory "beach" where waves, generated by a paddle, are measured electrically as they roll up the slope.

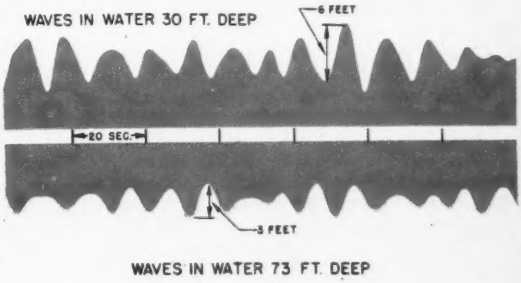
destructive forces. A tidal wave contains appalling energy. The average ocean wave is about 500 feet long and travels 10 to 40 nautical miles an hour. The wave that struck last year was 45 miles long and sped over the sea at 400 miles an hour! By the time it struck the beach at Hilo, capital of Hawaii, its length had shortened to about five miles, but its height had increased to 20 to 50 feet. Like a five-mile sledge-hammer it blasted to matchsticks the objects on the beaches which stood in its way.

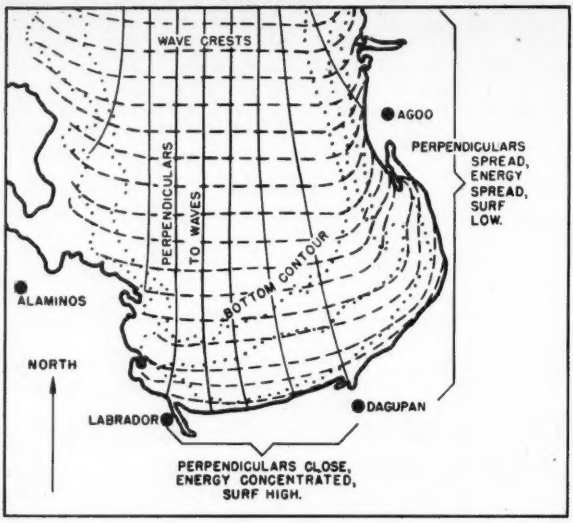
No precise estimate can be made, but, roughly, the energy in such a wave equals that of 1,000 atom bombs!

The tidal wave is Neptune's biggest

Tidal waves—on a small scale. As they roll down the pool they are measured against grid painted on side.

Two wave curves made by the new pressure recorders at different depths and distances offshore. Each section of the scale lying between represents the passing of 20 seconds.





Wave-prediction map of Lingayen Gulf, used in the preparation of Army amphibious landings. Broken lines represent crests. Note how the shore contour bends the waves.

gun, but it is not generally dreaded as much as his first-class storm. Big storms may severely damage even the ships that ride them out, and cause not only external repairs and replacements but internal strains as well.

Whenever we hear the words "storm at sea" we may substitute "waves" for "storm." For storms are made up of wind and waves, and it is the waves that do the damage.

One of the most promising objects of the new oceanography is the systematic study of waves as a means for locating distant storms. Hurricanes and typhoons send out waves far beyond their storm centers. One approach lays emphasis on the study of these waves. Weather forecasting of a unique type may be possible from such wave data.

Waves in their travels always tell a story. Their amplitude, frequency, variation and direction at any spot in the ocean or in a large lake are the result of all the recent weather hundreds and even thousands of miles away. If there were data enough, and knowledge for its interpretation, most valuable oceanographic predictions could be made.

Frequently ocean storms originate in spots far from observing ships, so that a storm may grow to considerable size before anyone sees it or knows where it is heading. Waves from such storms, properly interpreted, might quickly tell what is happening, and where.

The Navy's interest in ocean waves and weather multiplied during the war. Using LCMs, fighting an island-hopping campaign, the Navy had to foresee not only the coming weather at a beach marked for assault, but the kind of waves offshore, the size of the breakers and their location and frequency, the depth of the water, and how much the beach sloped.

The best beach information was obtained by the Navy's "frog-men" (underwater demolition experts), but unfortunately there were not enough of them for all needs.

Photographic reconnaissance proved one of the best ways to get the missing beach data because it was less hazardous and less likely to tip off the proposed operations. A high-flying plane would take overlapping pictures of the selected beach every few seconds. Experts interpreted these pictures. By measuring the distance the wave crests advanced between pictures, the experts could determine the speeds of the waves. Based on speeds, special graphs showed the depths. For depths under 15 feet the error was less than 15 per cent. No one can say how many lives were saved on our beachheads by foreknowledge of the depth, slope and waves.

Depth of calm, clear water was determined quickly by another method which used the Sonne strip camera to photograph the bottom. The plane would fly low, while a strip of film was pulled rapidly past two slits without shutters in opposite ends of the camera. Viewing the print with a special lens brought out the relief and depth of the bottom with strong stereoscopic effect.

The Navy found other ways to make the waves tell their weather secrets. Just before the war against Japan ended, Navy planes were ready to drop wave-measuring buoys in enemy home waters. Submerged recording devices in the buoys would register the changing water pressure and automatically sent the data by radio to a plane above. Large, flat discs which were designed to be hung

beneath the buoys would prevent them from rising and falling with the passing waves. After 20 minutes of radio transmission, long enough to receive the waves' information, the buoys would sink.

Another device was a pressure-operated recorder for measuring the waves and tides a short distance offshore. In friendly waters its signals would be received by attached electric wire; near the enemy it would make a self-contained record. Frog-men would plant them one night and recover them the next.

A recent British submarine device resembling an echo-sounder determines simultaneously the distance to both the bottom and the surface. All wave motion is recorded, for the time required for the upper echoes to return varies with the rise and fall of the surface.

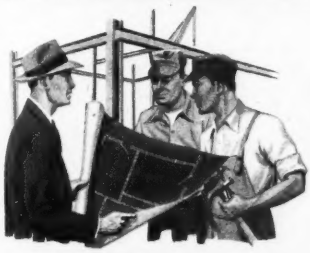
The method of determining water depth from aerial photos already is being put to peacetime use by the British in surveying inaccessible areas off the coast of Africa. This method will be of highest value in connection with offshore drilling for underwater coastal oil. And it will help a good deal in planning protection for beaches and harbors.

Accurate forecasts of sea-weather factors, particularly the waves and swell in partially exposed harbors, will do much to expedite shipping operations. To make the forecasts, however, oceanographers first will have to collect good data on the configuration of coastlines, underwater topography and other local conditions.

The Woods Hole Oceanographer Institution of Woods Hole, Mass., leads the research in this field. Photos in this article show some of the complicated apparatus it uses to simulate natural conditions.

The new wave studies may affect the design of ships and seaplanes. Passenger vessels built specially for the Pacific may perhaps proceed at higher speeds than those in the Atlantic, because average wave conditions there are less severe. Perhaps an optimum ship length for each of the several oceans will be found, since it is waves of about the same length of a vessel which affect it most.

Oceanographers may never prevent tidal waves, but they may be able to give flash radio warnings which will reach many of the people in danger. And they may never do much to tame specific waves in a specific storm. But by their wave-measuring, mapping and correlation of all the factors which make weather they will discover secrets of the surface of the sea—how man can avoid waves, how he can divert and reduce them at certain particular beaches and harbors, and how he can best survive the relentlessly destructive force of the sea's waves. •



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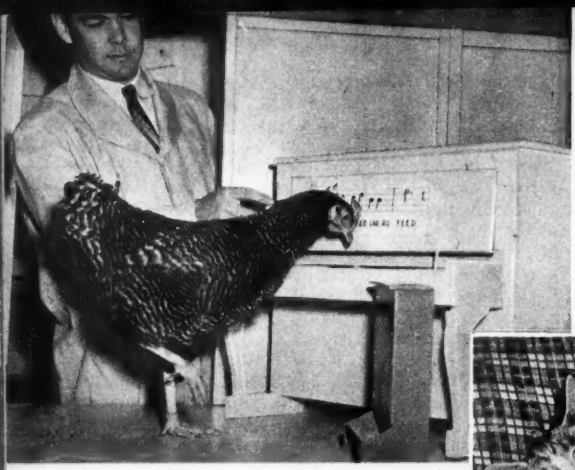
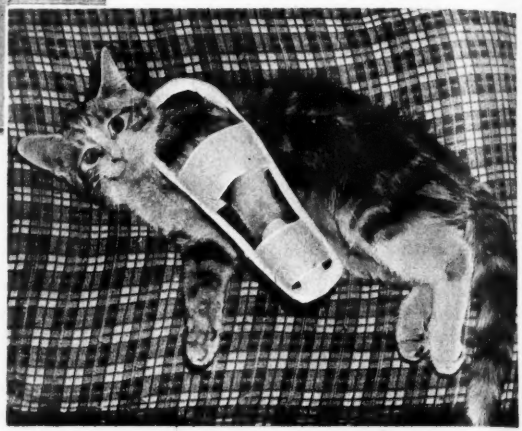
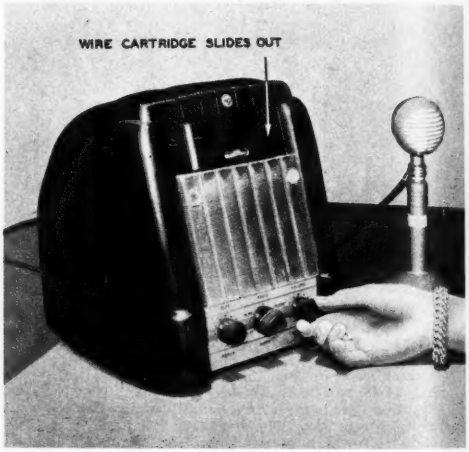


Slick Chick plays a tune on the piano—a slick trick that's been taught her by Prof. Keller Breland, psychologist, as part of his studies in chicken behavior. He's taught another chicken to tap dance in special shoes!



Kitten Kast. This little feline needed a bit of human help to keep her nine lives intact. Toffy (that's her name) caught her paw in the door, and a modern vet prescribed a type of "airplane swing" just like the one used on human patients with broken limbs. Purpose is to stretch muscles so that bone can knit easily.

Wire Recorder by RCA is simple enough for anyone to operate with but a few minutes' instruction. The wire cartridge is contained in the top of the instrument and slides out easily for replacement. Mike is used for recording; speaker in instrument is used for instantaneous playback. It is extremely light and portable.



Radiation Detectors—a laboratory-type Geiger counter (large), contrasted with a pocket-size one developed in 1945 for use in the event of an atomic war. Little one, long a military secret, now is being manufactured for peacetime use.

Has Russia the Atom Bomb?

[*Continued from page* 64]

We have been receiving from Russia in return for our manufactured exports raw materials. Three of these, manganese, chrome and platinum, are listed by the armed services as "strategic" or scarce and unavailable in sufficient amounts within our borders.

Russian manganese is particularly important to us. We get some manganese from U. S. worked mines in Cuba. There are large but undeveloped supplies in Brazil. Normal sources in India and Africa have been disrupted in postwar years because of railroad transportation and political problems. We need badly the manganese Russia is sending us until such time as alternate sources can be developed.

In fact, at the moment, we need Russian raw materials more than Russia needs the few American manufactured goods we are sending her. We should, however, cease giving the Russians free access to our technical "know-how" unless we are to receive some equivalent value in return. The very slight and slow help to the Russian industrial structure given by our present exports of machinery will have to be risked for a time, for we gain more by reciprocal trade with Russia than we lose.

Does Russia have the "carriers" to transport the bomb to American targets?

The day of the intercontinental missile, or of the supersonic transoceanic piloted plane is still a long way off.

Russia has some copies of our B-29, but not many of them. She has some German jet planes. She has the German V-2 type rocket and new type German submarines. German experts and technicians are working in Russia on the development of all these "carriers." But the work is still in the research and development stage; the danger is long-term, not short-term.

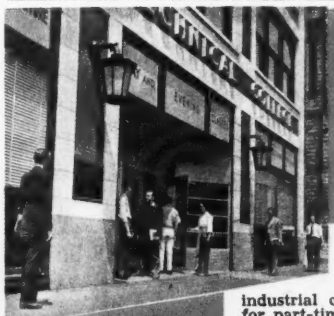
Will Russia start war soon?

Today, we have a far greater industrial potential and a far stronger power position than Russia. We have bases overseas near Russia, and Russia has none near us. We have "carriers" that can reach Russia from our overseas bases. Russia has no "carriers" that can reach us from her home territory. We have the atomic bomb; Russia doesn't. For all these reasons Russia is not likely to start a war in the near future.

All the answers to the preceding questions have indicated clearly, however, that Russia will someday have the atomic bomb and the carriers to transport it to this country.

Should we then, attack Russia now before

[*Continued on page* 93]



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Slingshot Marksman

YOU never had a slingshot like this one. As a kid, John Milligan didn't, either. He made his slingshots in the same happy, haphazard way all kids do. But one day—long after he'd grown up—he got to wondering how effective a *man's* slingshot could be. He experimented.

He wound up with a magnificent weapon. The fork is aluminum and the propelling band natural rubber. For ammunition he uses ball bearings. With this combination he does wonders.

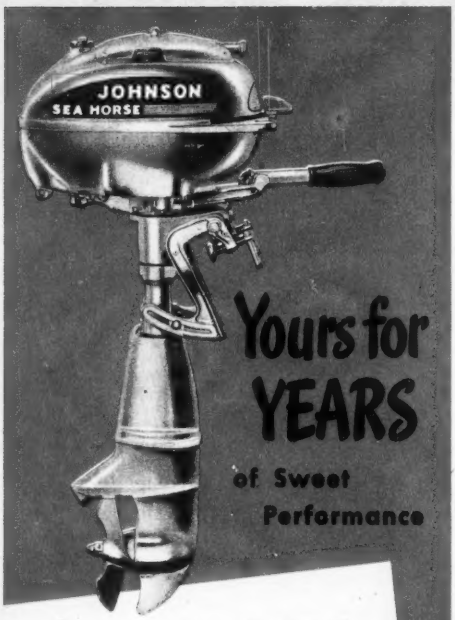
He'll snuff out a candle at 30 paces and crack a plate on the wing. He'll go hunting and bring back meat. Last season he got 17 rabbits, 12 squirrels and six pheasants—all fast-moving little critters. When hired to eliminate the pigeons at Detroit's City Airport, he brought down four out of the first five at which he shot.

Only with ball bearings—heavy, polished, perfectly round—is such accuracy possible.

Yes—it's a man's slingshot Milligan has, now. He says his steel pellets will carry half a mile, will rip halfway through a telephone book. Strong and careful hands are needed. Such a weapon is not for kids. •

Here's how he does it

Milligan's ball bearing has made a clean hole in the plate at left—not merely cracked it. In a second there'll be one in that balloon.



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Toss-Bombing

[*Continued from page* 65]

bombing accuracy on difficult targets.

The new system perfected by our Navy is called toss-bombing—and it is *just* that. The bombs, instead of being released during the dive, are now retained until *after* the pilot has begun his pull-out, then they are automatically released near the bottom of the pull-out arc.

This gives them a "toss" toward the target which overcomes the old pull of gravity and the breaking effect of air resistance.

The new device computes automatically the amount of delay required to give the bomb the exact amount of toss to reach the target.

The pilot must still make allowances for a moving target and any over-ambitious wind drift, but he may make his runs higher, faster, and hold on the target only the required few moments for the gadget to get in its automatic dirty work, figuring out the correct amount of toss needed to bulls-eye the target.

It works well on either bombs, torpedos or rockets and so enables such ships as Avengers and Helldivers to make short "clean" dives, recovering well out of range before the anti-aircraft can track them accurately. •

MI Tests the '48 Hudson

[*Continued from page* 81]

82 mph. In the same car, under the same weather conditions, over the same stretch, I tried it again, when it had 2,700 miles registered, and clocked it at 91. Most good stock cars are not really thoroughly broken in before they've gone 5,000 miles.

Here are some pertinent specifications on the '48 Hudsons:

The 6-cylinder engine develops 121 hp at 4,000 rpms; compression ratio is 6.50 to 1; bore, $3\frac{9}{16}$; stroke, $4\frac{3}{8}$. The 8-cylinder engine develops 128 hp at 4,200 rpms; compression ratio is 6.50 to 1; bore, 3; stroke, $4\frac{1}{2}$. Wheelbase on all models, 124 inches. The overall length is $207\frac{1}{2}$ inches.

All the specifications which follow are alike for both the 6- and 8-cylinder models. Extreme height is 5 feet from the ground. Inside body width is 66 inches at the widest point. Average seat width is $63\frac{1}{2}$ inches. All cushions are Airfoam. The springing consists of independent coil springs in the front and long leaf springs in back.

In spite of the car's low silhouette, there is ample headroom for a six-footer. This has been achieved, in part, by lowering the seats and floors and placing the rear seat in front of the rear axle, instead of over it as has been the custom. •

Atom-Bomber

[*Continued from page* 59]

The B-36 is equipped also with the largest propellers ever installed on an aircraft—19 feet from tip to tip. Thermal anti-icing is provided for cold weather, high-altitude flying. A reversible pitch mechanism makes short landing runs possible despite the bomber's massive size. A simple control throws the propeller blades in "reverse" and they act as "air brakes." It is uncanny to see this monster plane land, come to a quick, smooth stop, then back up the runway to a taxi strip.

The takeoff, too, is something to watch. Starting down the runway smoothly and easily, the mighty bomber takes on a slow-motion-movie appearance as it finally becomes airborne. Its takeoff run is 5,000 feet over a 50-foot obstacle.

The nose of the B-36, which normally carries a crew of 12 with a four-man relief unit, is equal in size to ten average living rooms.

Fighter protection for the AAF's new atom bomber, a big target for advanced attacking techniques such as proximity fuses and guided missiles, is not the problem it seems. Its service ceiling of 40,000 feet places it beyond the range of anti-aircraft fire or efficient fighter attack. Still the atom bomber must be prepared to defend itself. For this, its engineers have several answers.

In addition to eight gun turrets, each equipped with two 20-mm cannon electronically sighted and fired at an enemy attacker, the B-36 has another advantage. To attack a bomber successfully, a fighter must be capable of a speed at least 25 per cent greater than that of its quarry. The atom bomber's speed of nearly 400 mph, then, runs an attacking fighter squarely into the compressibility problem. The fighter has to reach at least 500 mph if it is to fly rings around its target.

Now a fighter's maneuverability decreases as its speed increases, to say nothing of the added physical burden on the pilot under such circumstances. These two factors help protect the B-36, since an attacking plane is yet to be devised that can engage in aerial combat at such a speed.

Jet fighters have exceeded a speed of 500 mph in level flight, but there is no indication that maneuverability in combat, even in these planes, can approach the high level of efficiency required at such speeds.

The B-36's ace-in-the-hole, however, is a startling innovation in military air science—the "parasite fighter." Each of the mighty bombers will be capable of carrying in its bomb-bay section three tiny jet-powered fighters, to be released against the enemy if "things get hot." These bantam fighters, XP-85's built by the McDonnell Aircraft Corporation of St. Louis, are vest pocket versions of the same company's famous jet-propelled Banshee Navy fighters now in production.

Although the "parasite fighter" will have a comparatively limited range, it will have the advantage of going into combat with a full fuel tank as the B-36 disgorges it in flight.

With all this multiple protection, the massiveness of the B-36, ostensibly a handicap since it offers a large target area, will in no way impair its efficiency as a fighting machine.

Its very existence, in fact, may prove a psychological deterrent to war. Coupled with the United States' possession of the atomic bomb, the AAF's new power of instant and devastating atomic retaliation should make a potential enemy think twice before he starts throwing his weight around. •

Has Russia the Atom Bomb?

[*Continued from page* 89]

she has the bomb—wage a "preventive" war against her—to protect ourselves against possible future atomic attack?

The answer is emphatically "No!"

The reasons are many.

First, such a course would be morally wrong. We would be putting ourselves in the same class as the Nazis we hanged in Germany. We cannot attack another nation merely because we are afraid.

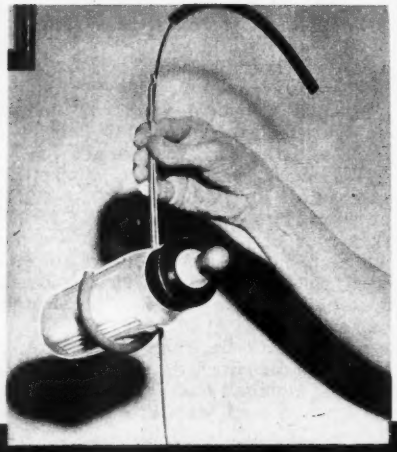
The supporters of a "preventive" war assume, erroneously, I believe, that we have enough atomic bombs now to insure our quick and easy victory. This is wrong. The Russian armies would overrun Europe. The war might be long and hard.

In defeating Russia we would destroy the values in Europe which we are now trying to save by the Marshall plan. That continent already is weary and war-torn. Another war now would almost certainly finish it and would undoubtedly eliminate our friends. We would solve nothing. The eventual outcome, even after we had won a long hard war, would be worse chaos than now exists.

Those who believe in "preventive" war make another false assumption. They regard a future war with Russia as "inevitable." That is a strong word. No man can predict the future. Stalin will certainly die in the next decade or so, and there may be a "palace" struggle for power to determine his successor. Internal pressures in Russia may force changes in external Russian policy. However, should war come a quarter century hence, the fear of retaliation might prevent use of the atomic bomb and other mass weapons of destruction—even if no satisfactory system of control has been worked out. •

New for the Home

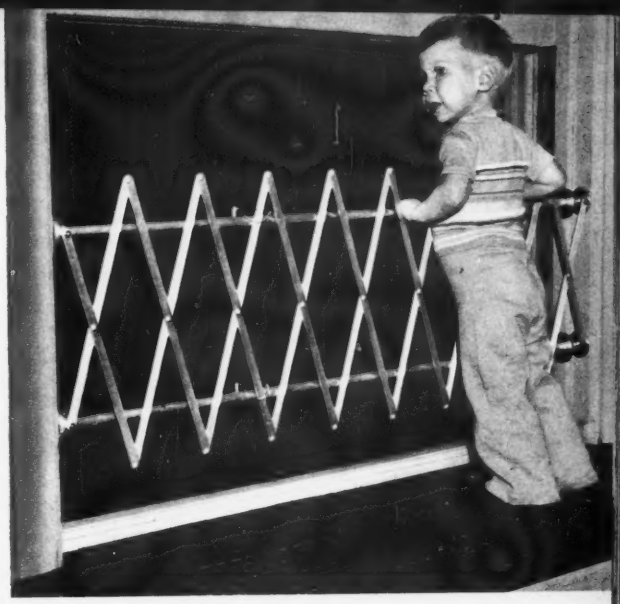
Baby Can't Fall out of a crib equipped with the new Crib Roll, a special roller which can be attached to the side piece. It will spin inward but not outward, and so thwarts the escapist ambitions of young acrobats bent on mischief.



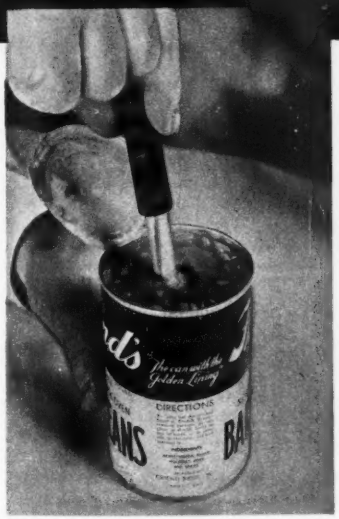
Bottle Holder invented and here demonstrated by the ingenious Mrs. C. G. Pearson can be hooked to the busy mother's shoulder, largely freeing her for other activities. Hook is adjustable and attaches to baby's crib, too.

Lightweight Lawn Mower of new design is easily held up with one hand. Probably mowers can't be made much lighter than this. A certain amount of weight is needed to give momentum in hard going.

Adjustable Guard of aluminum prevents the youngster from diving out the window or entering forbidden rooms or staircases. It's held fast by compression at the ends of its bars.



Pocket-Size Heater. the Heatron Stirrer, provides quick heat through a six-inch stirrer and a cartridge-like charge placed in a heat cup in one end. It can be used as shown.



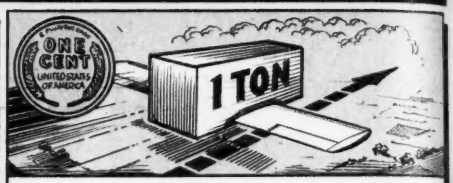
Gun-Grip Soldering Iron makes hitting the target easy, even when it is small and hard-to-get-at, as in the tiny new radio sets. It's much less fatiguing than the conventional type, too. The low heat conductivity of plastic handle protects against iron's heat.

A PENNY'S WORTH

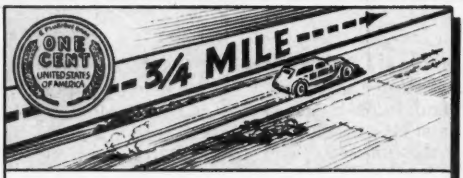
BY G. KIPNIS

A penny's not a lot of money, but you'll be surprised at how much of some things it will buy.

A penny buys 20 pages of big city newspaper, providing several hours of reading material.

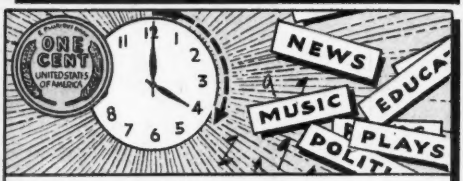


A penny will move a one-ton shipment of merchandise by air express nearly a hundred feet.



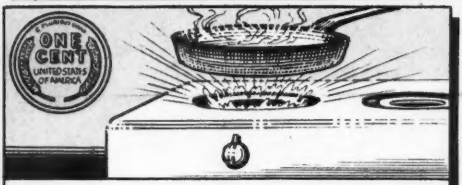
A penny's worth of gas will drive a two-ton automobile with four people about 4,000 feet.

A penny stamp will deliver a card across the United States and over the Pacific to Guam.

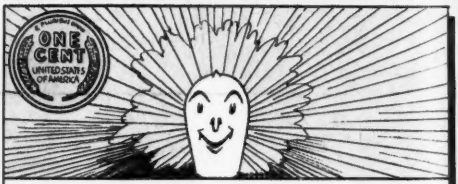


A penny will buy over seven hours of radio entertainment by top-price big-name performers.

A penny will buy 50 gallons of tested, healthful water, delivered by pipe into your home.



A penny will buy enough gas to fry an egg for each of 72 persons, doing them four at a time.

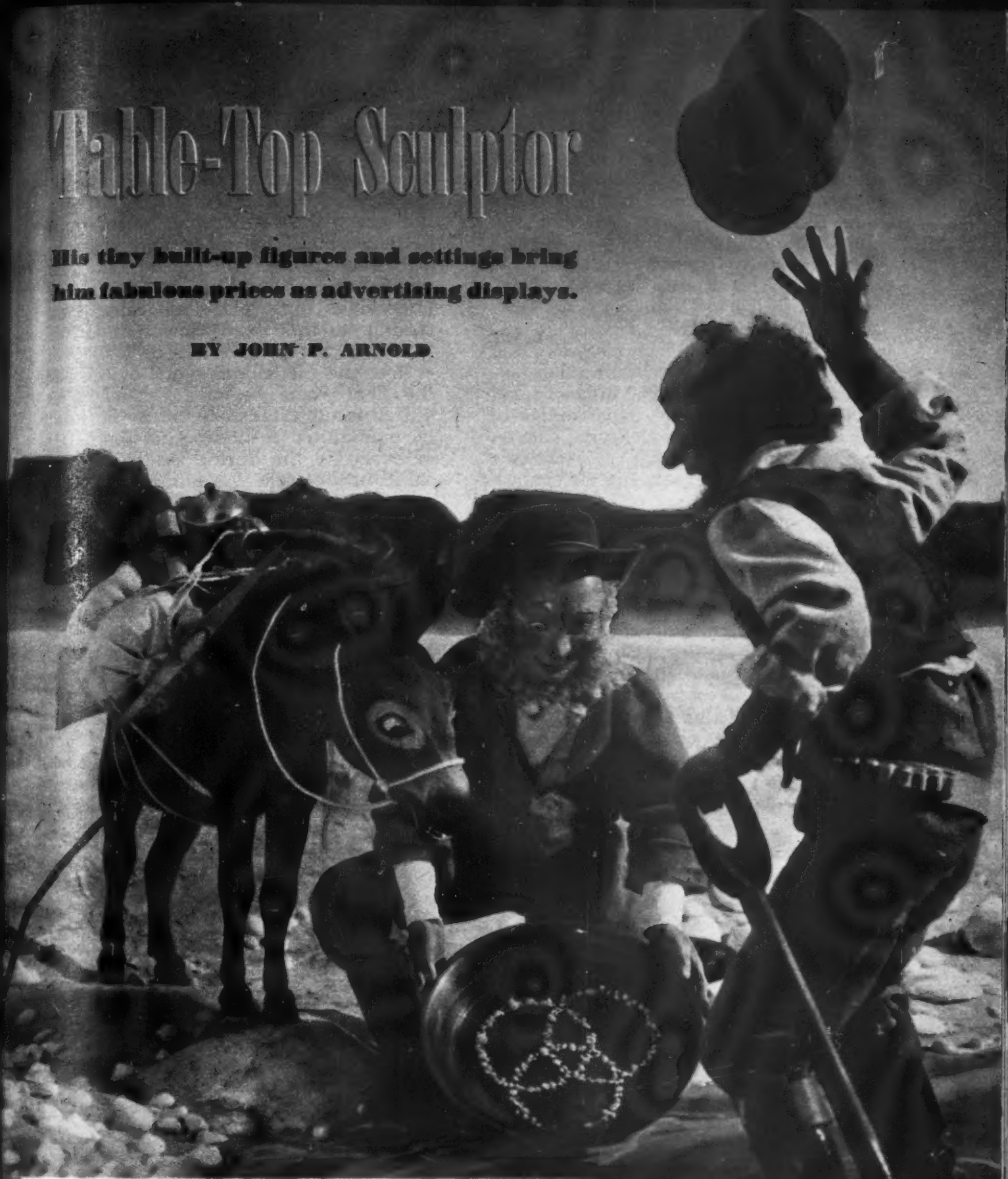


A penny will buy enough current to illuminate a room (60-watt bulb) for four full nights.

Table-Top Sculptor

His tiny built-up figures and settings bring him fabulous prices as advertising displays.

BY JOHN P. ARNOLD



DON'T look now, but that man's making a scene again. Maybe that's no bonanza in the crusty old prospector's pan, but there're both gold and glory in the scene for Forrest C. Crooks. And Mr. Crooks is having more fun than Punch and Judy in making scenes for his "real-life" miniature stage.

Mr. Crooks started something new in advertising illustrations. A magazine illustrator by profession, Mr. Crooks put aside his brush and pen to take up

carving and set designing to "build" new drama into advertising.

Have you noticed recently the magazine advertisements in which the illustrations look like marvelously detailed and naturalistic scenes actually constructed in miniature and reproduced in color? That's just what they are.

Mr. Crooks, a pioneer in this technique, performs his magic in a renovated barn on a farm in Bucks County, Pa.

Around Mr. Crooks is a group of experts. His wife, their son, Corydon, and Corydon's wife, with several other assistants, are all skilled craftsmen and specialists in the many departments of this varied art—woodcarving, metal work, painting, costuming, research. Mr. Crooks puts all his experience as a magazine illustrator, designer of stained-glass windows, and an innovator in enamel work, ceramics, and textiles to use in solving the intricate problems of building advertisements in three dimensions.

Mr. Crooks first gets a sketch of the page layout for the advertisement from the advertising agency. Since the constructed scene must conform to the layout's space allotment for text and picture, this sketch serves as a rough blueprint.

Problems of composition, lighting, perspective, and scale are studied initially by making a cardboard mock-up of the scene. For reference he sketches the scene on glass with a grease pencil.

This perspective screen, a device often used by muralists and sculptors, is set on a standard at a fixed point while the set is being built. By looking through the screen the set designer can see how he must build his stage and place his actors and props in the scene. Later, the photographer taking pictures for photoengravings must place his camera according to this fixed viewpoint, or the "built-in" perspective will be lost.

Now the meticulous work of building the final scene begins. Extensive research is undertaken to assure accuracy on the setting, costumes, and the details of everyday life during the period pictured in the scene. A landscape set, for example, may require 50 or more objects —trees, bridges, houses, human figures, animals, and geographical features, all of which must be natural as life but exciting as the first night of a Broadway hit.

To simulate effects such as ice, running water, or a storm at sea, Mr. Crooks often has to try to improve on nature. Only by exhaustive trial and error does the designer learn to portray a frozen pond by staining paraffin a pale blue-green; to make stars twinkle by drilling small holes on a painted backdrop and backlighting it; or to pour mineral oil down a painted creek-bed while the scene is being photographed as "running water."

Base for a set, which may be from five to seven feet square, is made of thin plywood built up to the required shape by papier-mache. The only portion of a scene that is not worked out in the round is the backdrop representing a distant landscape or the sky, which ordinarily is painted on hard board or canvas.

Mr. Crooks carves animals and smaller human figures from well-seasoned poplar, but the mannikins which occupy the foreground of a scene are as precisely made as the models used in an anatomy class and may be posed realistically standing, sitting, running, or walking. These are stock torsos, ten inches high. Different heads, hands, and feet can be

Shooting the set, John A. Cook (right), art director for J. Walter Thompson Co., poses the flying hat for the camera.

attached to depict either sex and whatever type of character is desired. Mr. Crooks uses the skill he acquired in his hobby of puppet-making to turn out the odds and ends of anatomy needed to create the new characters as his drama unfolds.

After the characters have been painted, they are fitted with wigs or beards and decked out in full costume. At last the characters are ready to strut their brief hour upon the stage. Their little drama acted out, they are dismantled until they can come to life again in some other role.

While Mr. Crooks is supervising the set and carving out the figures, other details are being prepared by his staff. Mrs. Crooks dresses the mannikin to suit his part. Corydon Crooks works out the "built-in" perspective.

Three weeks or more is required to produce an elaborate scene. Every set poses new problems, and often work must be suspended until experiments show how to dramatize on the little stage some novel look of man or nature.

After a scene has been completed, it is packed carefully and shipped to the photographer. From these photographs color plates are made for the printer. Then the presses roll, and the miniature drama is staged again before you in the pages of your magazine. •

Shaping a head with easy strokes, Mr. Crooks deftly whittles a new figure from a bit of poplar.

The stage director now spots his props for a final set. Scale is based on the position in the setting.

PHOTOS ON NEXT PAGE

Chic croquet scene shows the "New Look"—as of 1848. Below, a toast to that smoke-belching steamboat "comin' 'round the bend." Old Man River rolls realistically through the four-by-six-foot Mississippi set.

A prancing six-horse team trundles this Conestoga covered wagon back out of the past in this lively scene from "the good old days." Spars of the wooden ship cover the waterfront below as the tars hit the shore.

It's the Biggest... It's the Newest...

But Palomar Telescope Won't See Far Enough!

BY LOGAN REAVIS

SOME time this year an astronomer will peer for the first time through the largest telescope the world has ever known—will penetrate space to a distance of two billion light years farther than the eye of man has ever explored.

But he won't see far enough.

When the huge 200-inch monocle of science is finally completed after 18 years of work at a cost of $6,000,000, the astronomer will discover hundreds of millions of stars which man never knew existed. He will discover vast new secrets of the universe. He may find new planets and perhaps learn whether there is life on those he already knows.

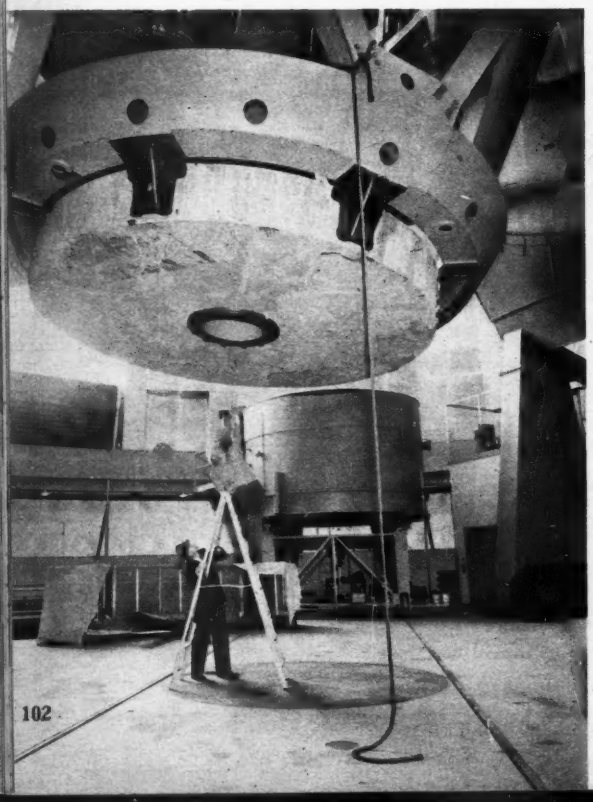
But he won't discover enough and he won't learn enough.

California's "giant eye of Palomar" will be perceptibly dimmed by a no-man's land of dust which hovers above the globe at an average height of seven and one-half miles. This is the layer known as the tropopause in which the temperature ceases to fall with increasing altitude. It lies between the troposphere, the atmospheric layer in which man lives and works, and the stratosphere, and is about five miles thick at the poles and ten miles at the equator.

The tropopause is the catch-all basin for dust storms which swirl upward from the arid regions of the earth, for volcanic soot and for sand-storms, all carried upward by thermal currents and deposited there. And there they sit, dust in the giant's eye, distorting celestial images and impeding significant lines of the spectrum.

Scientists have come out with a daring answer. If a land-based telescope is hampered by a layer of dust in the sky, they ask, why not put a telescope *above* the layer so that crystal-clear vision may be obtained? Why not, in short, put an eye in the sky?

This bold plan has come from the fertile brain of Dr. Lyman Spitzer Jr., associate professor of astrophysics at Yale University. He has taken the theories of several noted physicists and



Lower end of the Mt. Palomar giant, with a 20-ton concrete disk substituting for the mirror. This telescope, big as it is, won't tell scientists all that they would like to know.

Declination drive of the great telescope. It is gearing like this which provides the motions by which telescopes automatically follow a star.

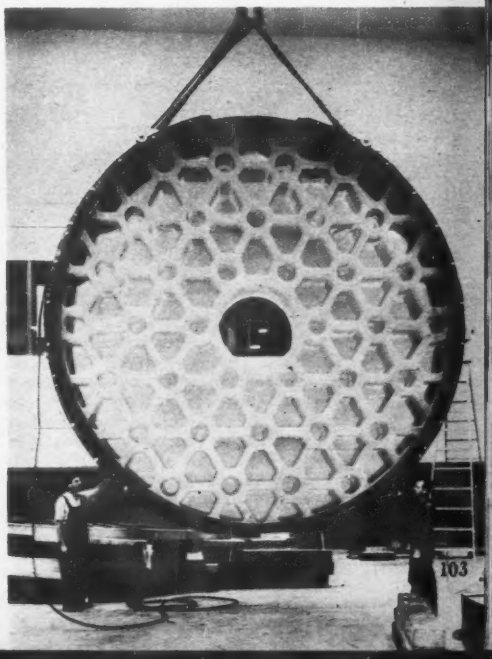
engineers and woven them, with his own, into a specific design for an artificial satellite circling the earth. He plans an observatory spinning about in space more than 22,000 miles above the earth's surface, on which astronomical instruments could unravel the mysteries of the skies far more effectively than any post on this planet.

But first would come the problem of transporting the materials into space to construct the platform. How can the scientists get them up there, in view of the fact that more than 600 tons of the types of fuel known today are needed to move just one ton of material into space?

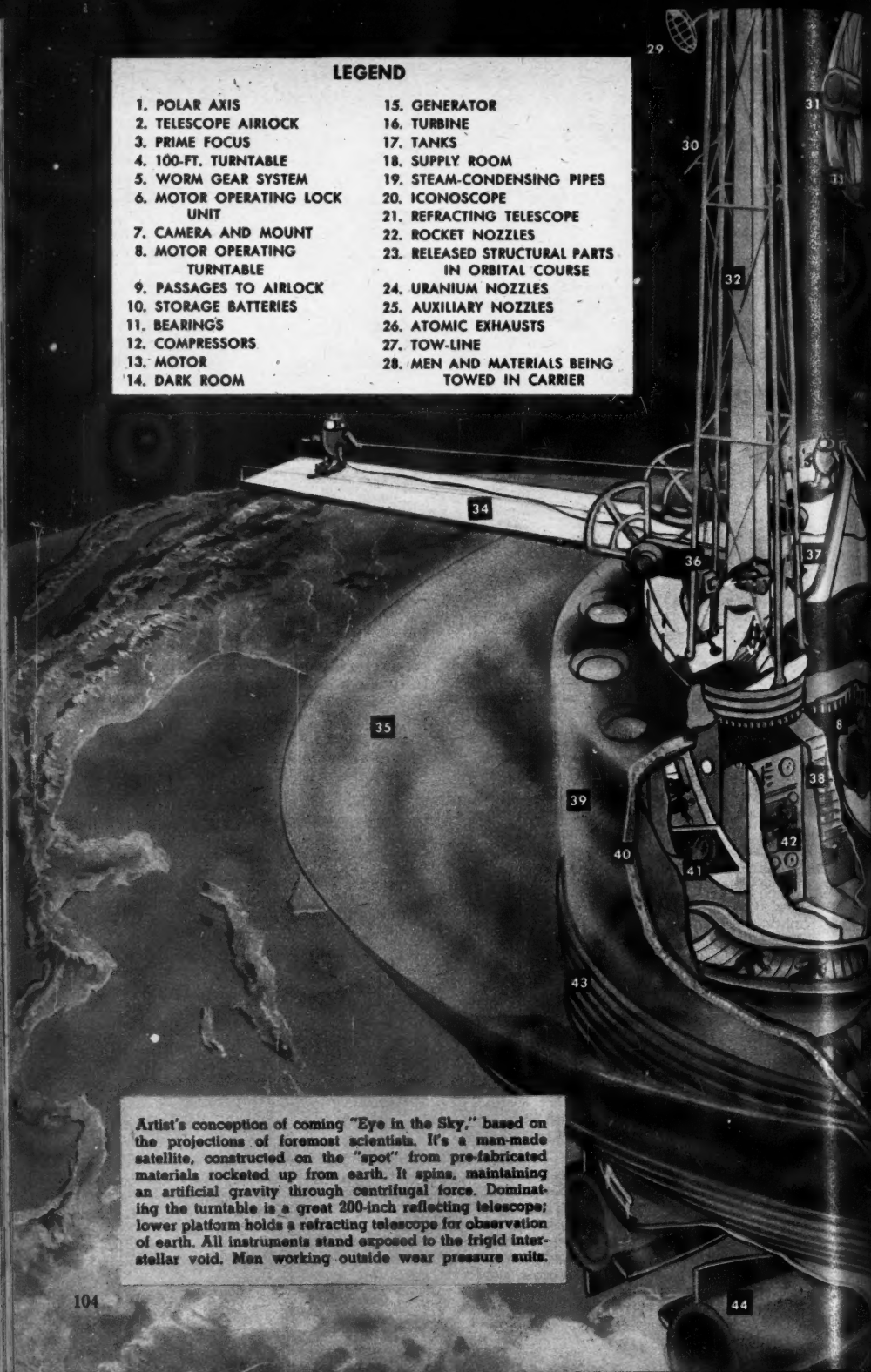
The answer symbolizes the age in which this startling project may become a reality: atomic energy, the only energy source powerful enough for that job.

Atomic energy would be the gasoline and—another scientific miracle—rockets would be the moving vans! Rockets, carefully insulated from suspected high temperatures in the upper realm of the stratosphere, would tow the prefabricated parts upward for assembly "on the spot" in the stratosphere.

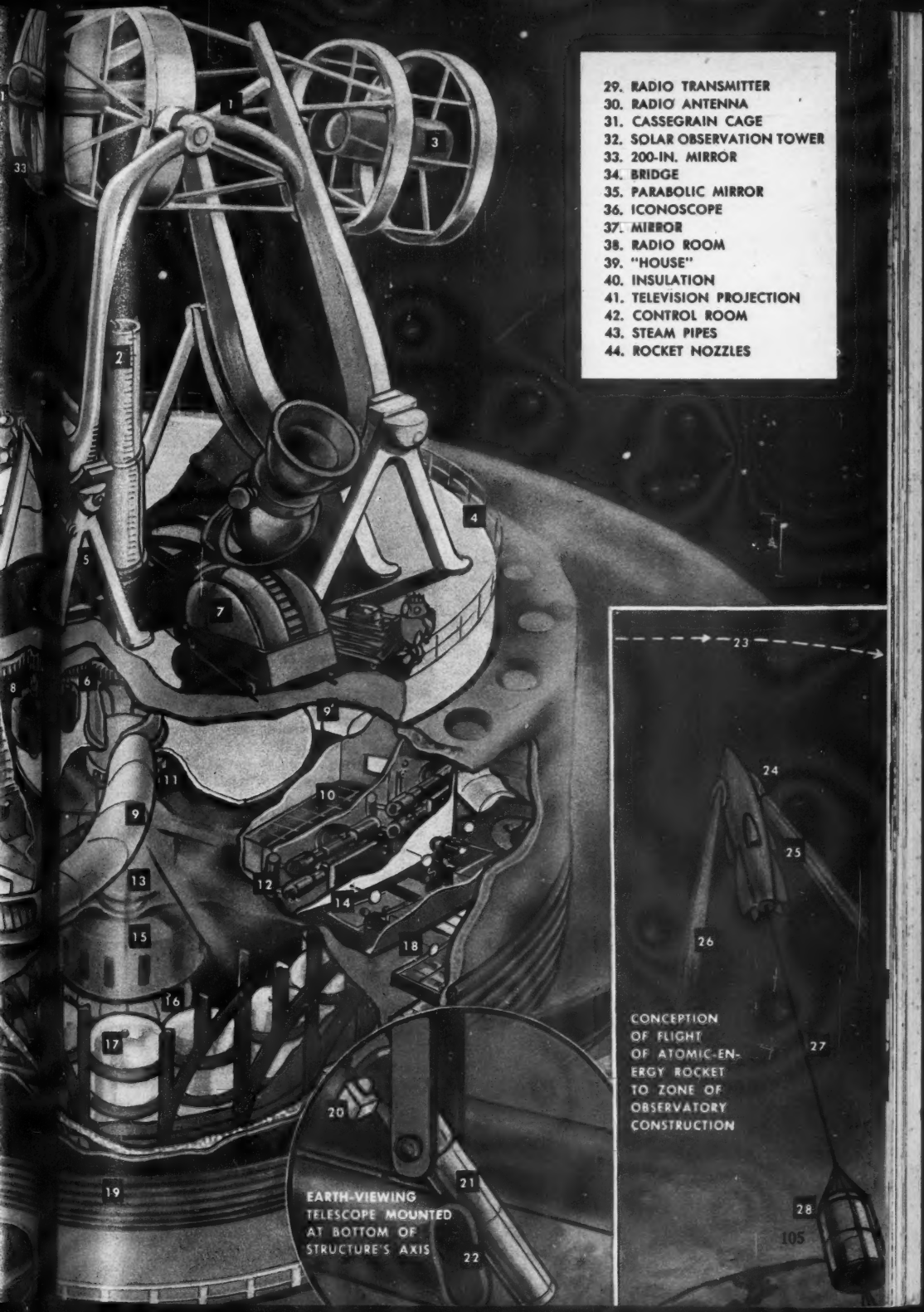
Let's have a [*Continued on page* 162]

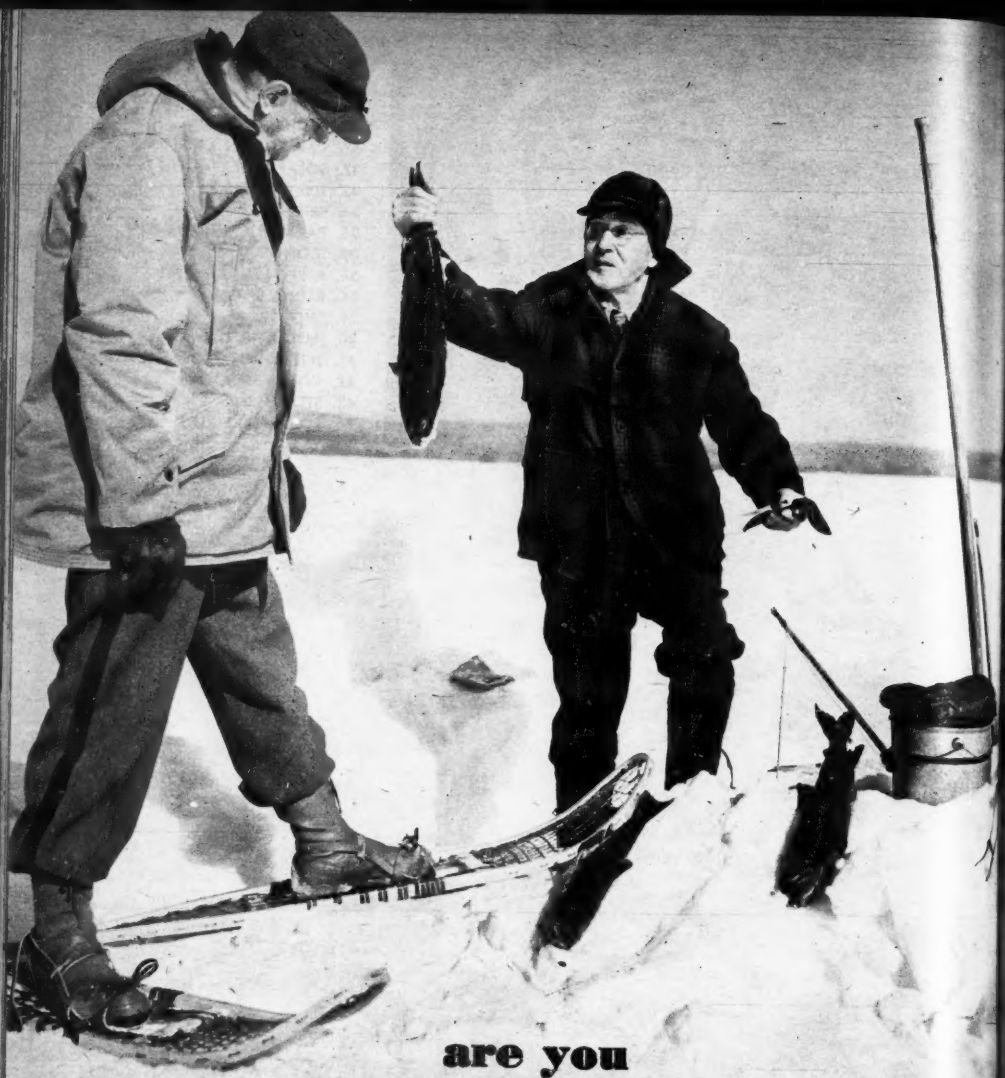


Paloma's 200-inch pyrex mirror is almost ready for its job as earth's keenest space-probing eye—but it won't be so keen. Dust, haze and temperature changes will cover it with a permanent veil. Only a telescope in space—on a man-made satellite or the moon—will give ultimate sight.



Artist's conception of coming "Eye in the Sky," based on the projections of foremost scientists. It's a man-made satellite, constructed on the "spot" from pre-fabricated materials rocketed up from earth. It spins, maintaining an artificial gravity through centrifugal force. Dominating the turntable is a great 200-inch reflecting telescope; lower platform holds a refracting telescope for observation of earth. All instruments stand exposed to the frigid interstellar void. Men working outside wear pressure suits.


29. RADIO TRANSMITTER
30. RADIO ANTENNA
31. CASSEGRAIN CAGE
32. SOLAR OBSERVATION TOWER
33. 200-IN. MIRROR
34. BRIDGE
35. PARABOLIC MIRROR
36. ICONOSCOPE
37. MIRROR
38. RADIO ROOM
39. "HOUSE"
40. INSULATION
41. TELEVISION PROJECTION
42. CONTROL ROOM
43. STEAM PIPES
44. ROCKET NOZZLES
EARTH-VIEWING TELESCOPE MOUNTED AT BOTTOM OF STRUCTURE'S AXIS
CONCEPTION OF FLIGHT OF ATOMIC-ENERGY ROCKET TO ZONE OF OBSERVATORY CONSTRUCTION



are you MISSING GOOD FISHING?

ARE you a fair-weather fisherman? Dreaming of the fine catch somebody else is hauling out of that green lagoon down South, gnawing your nails until the fish start leaping in your favorite fishing hole, come summer again?

If you're keen about fishing, don't toast your feet by the fire and shudder while the snow flits past your window and the winter wind knifes into your home. Bundle up and go ice fishing.

See that big one James Daigle is showing Chief Warden Morse up at Moosehead Lake in Maine? A bigger one may still be cooling his fins under the ice for you.

Pictures here were taken in Maine, where the ice-fishing season runs from November to April. Any place and any time there's ice, though, you can find for yourself the wind isn't the only thing that's biting. Fish have a rough time, too, during the winter. Rations are short—no

Ice fishermen on Maine river come out for a daily get-together in front of their shacks.

Cozy inside the shack, Betty Webb watches for a bite as Del Bissonette jiggles the line to lure the fish.

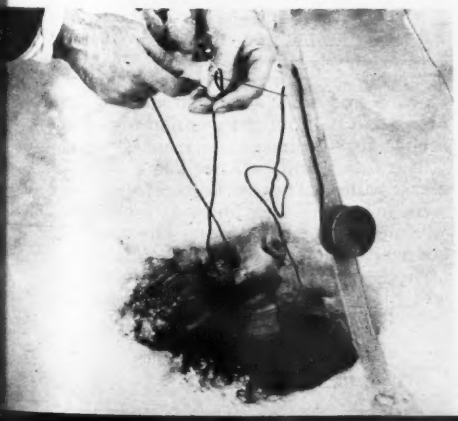
juicy bugs fluttering on the surface, no fat insect larvae wriggling through the water. Break the ice, give the poor fish a chance!

Like to keep warm? Fishermen on the Eastern River slide shacks out on the ice to keep cozy while fishing through "the floor" or waiting for the night tide to bring a smelt run. Build a hut, make it homey with chairs, lanterns, a stove, and a pan big enough to fry that "so-big" fish.

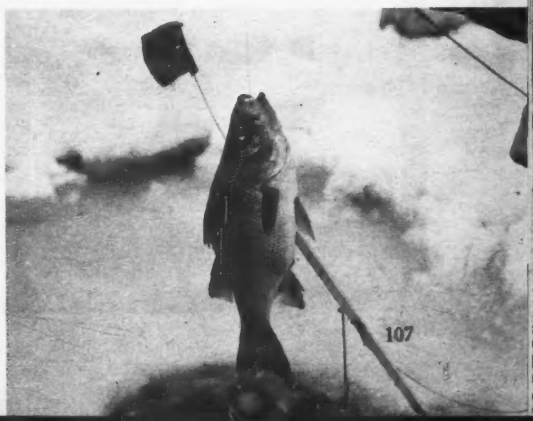
Like lazy fishing? Make your fish signal when he's ready. Allow enough line to reach bottom, slip a loop over the rounded part of a trip tied to a small red flag. The fish hits the hook and pops the flag.

Cold? The Eskimo shivering by his seal hole, the stateside ice bather whacking off the icicles, never had it so good. That cold puts the "bite" in your appetite. And when you fry up that first ice fish, whether it's smelt, pickerel, perch, some other game fish, or just plain sucker, you can bet it's going to be the finest fish you ever tasted. •

Trap is set so that the striking fish slips the loop from the trip and springs the warning flag upright.

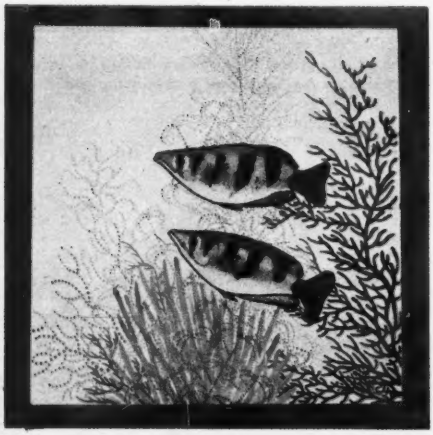


"Come and get me," this perch signaled the fisher by yanking the hook and hoisting the red flag.



Colored Tiles—Easy to Make

Photos by Leeser, Camera Clix



BY WILLIAM A. BURNS
Acting Associate Curator American Museum of Natural History

PAINTED and glazed tiles are one of the most durable works of man. With easy-to-get materials, with designs taken from magazines or pictures and with a minimum of care and skill, you can create works of art that will delight you and may puzzle archaeologists in ages to come!

The first thing you need is a supply of glazed tiles. They're inexpensive. They come in various sizes and may be bought in any plumbing supply store. The glazed tile is easier to work with than the unglazed.

Next, find some design or picture that will fit the size of the tile. You may find

Here's a simple home-craft giving you startling and beautiful results.

something suitable in this very issue of MECHANIX ILLUSTRATED. Clean the tile. Its surface must be free of dust, grease or dirt. Swab it with a piece of cotton dipped in ordinary rubbing alcohol. Be careful not to touch the clean surface once you have allowed the alcohol to dry.

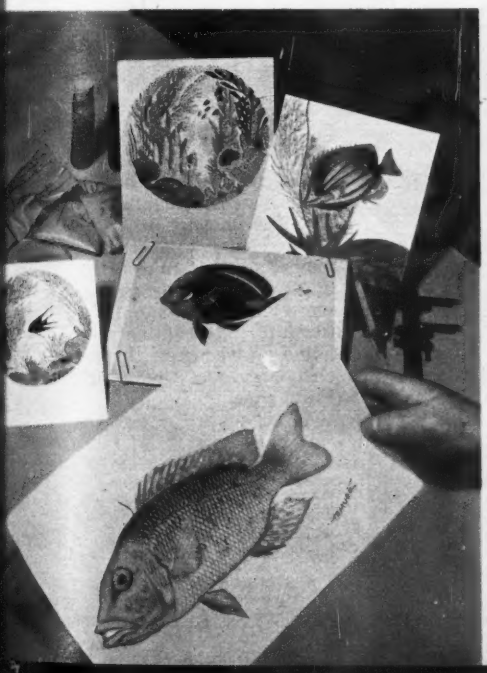
Locate the picture over the tile, then insert a piece of carbon paper under the picture and trace its outlines, using a hard pencil, well sharpened. During the tracing, take care not to shift the paper or your work will come out crooked. Do your tracings before you begin to paint so that you will use up each color in one operation.

Tiles are painted with China colors. You can get them in your local paint store, together with the special oil that is used to mix them. Get enough colors the first time. You can mix them in small glass cups or in small mayonnaise jars. Mix just enough colors for one batch of paintings; if you don't use them up they will harden and dry. In mixing, blend with small amounts of the mixing oil. The consistency ought to be about that of oil paint as it comes from the tube, solid enough not to run.

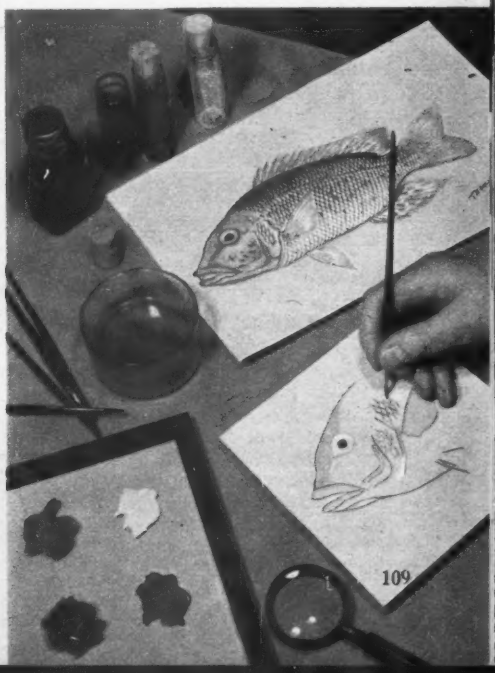
When your colors are mixed, take a fine-pointed brush, dip it into one of the colors and practice on a spare tile. Use the point of the brush to make thin delicate lines. Use its side for heavier lines and for completely solid areas. Also practice stippling—that is, making fine dots to fill in large areas. Stippling is more effective than solid color. When you feel competent to

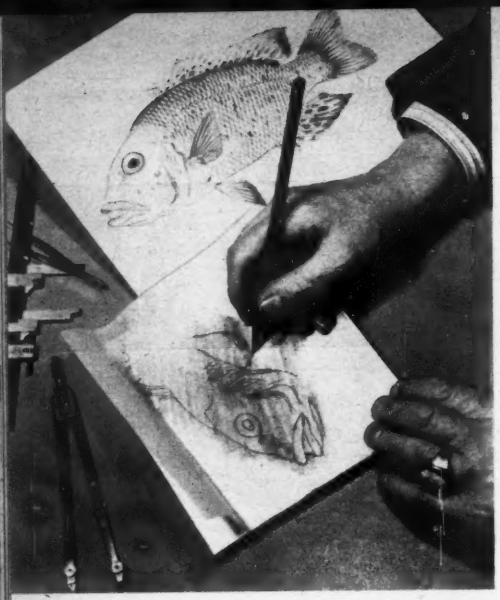
Tiles may be framed and used as pictures, as in this painting of a seahorse in an undersea garden.

Pictures from magazines and travel folders provide material for the paintings. Fish like these make unusually good subjects for bathroom tiles.



After the outline of the picture is transferred to the tile, ceramic colors are used with a fine-pointed brush to duplicate the original colors.





A tracing of the picture has been made, and the back of the paper rubbed with a soft pencil. Now, re-tracing leaves the picture on the blank tile.

work on the transferred design, proceed with care.

You can use two techniques in tile-painting, line work or stippling. In line work you can use all the color you want. Stippling is more effective when done in lighter or darker shades of the same color. Make sure that your China colors are smoothly blended with the oil and do not overload the brush. It is easier to go over a line than it is to erase the whole thing with alcohol and begin over.

When the tiles are all finished, lay them flat on wrapping paper in a dust-free place. Allow them to dry for 48 hours. If they're not dry the colors will smudge in packing and shipping.

You will probably not have an electric kiln at home but you'll find establishments in your vicinity that do fire pottery and tiles. Community centers and school workshops frequently have kilns. Locate the nearest one and arrange to have your tiles fired. It will not be expensive.

It may be necessary to pack the tiles for shipping if the kiln is not in your immediate neighborhood. Using hard-surfaced paper (ordinary good bond writing paper is ideal), cut out squares a little larger than the tiles. Pack the tiles in pairs, face to face, with a square of paper in between. When all the tiles are so paired, pack them in a box the same size as the tiles so that they will not shift during transportation.

When your tiles come back from the kiln they will be covered with a hard glaze that will resist water, acid, heat, sunlight and wear. Now your imagination comes into play. What can you do with these colorful products of your own skill?

For one thing, you can use them as they are for coasters. A cocktail set with a friend's initials on each tile would make a wonderful Christmas present. Or you can set your tiles around a mantelpiece for decoration. You can tile the edge of your fireplace. You can make tile lamp bases, book ends or tile-fronted flower boxes.

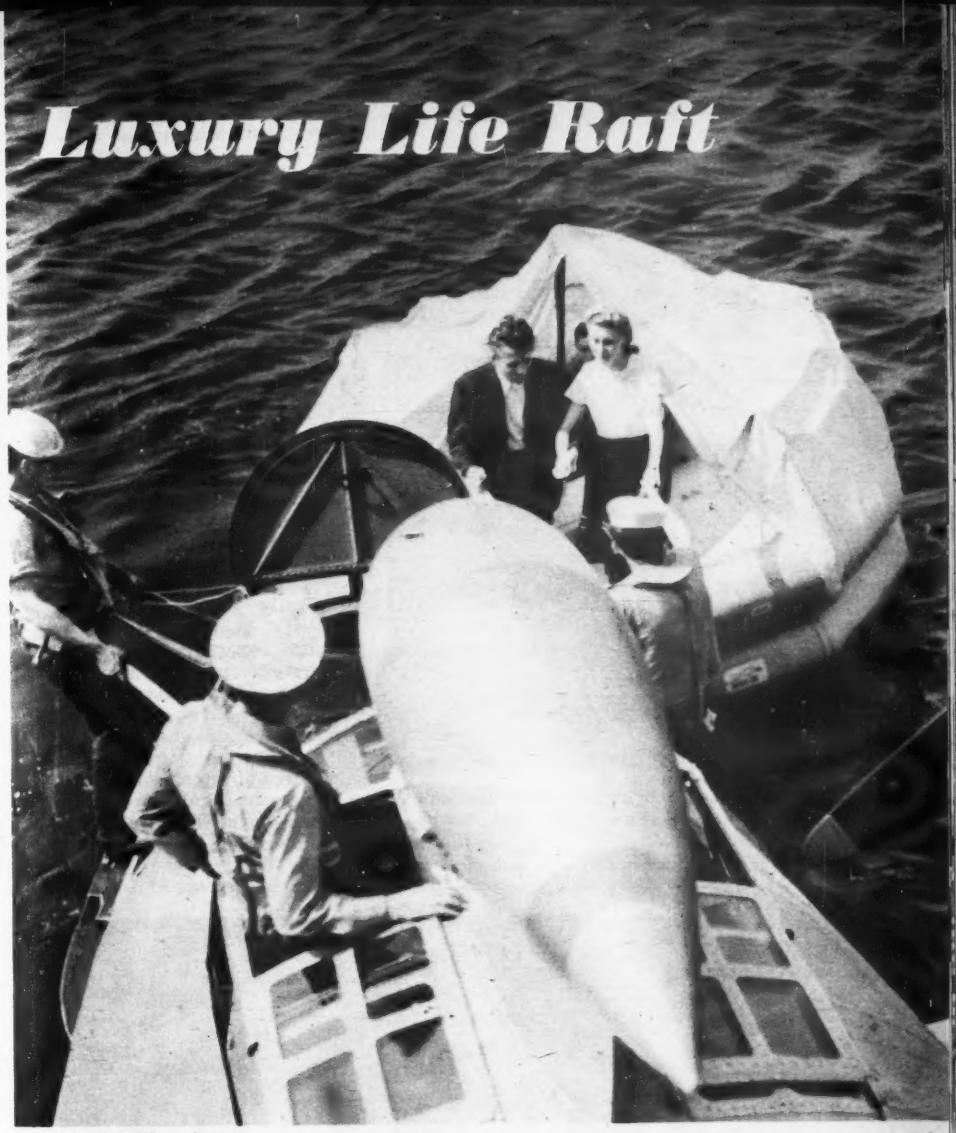
If you feel very ambitious you can tile a bathroom or at least insert a frieze of your own designing. Tile-topped tables are popular. You can buy a wrought-iron table with a slate top, then cement the tiles to it with ordinary tile cement. Fine large tiles may be framed like pictures.

Many other uses will occur to you when your tiles return from the kiln.

Tile painting is fun, and it has historical significance too. The ancient Assyrians painted tiles thousands of years ago that are as bright and colorful today as they were when first taken from the kiln. So brighten your home and confuse the archaeologists of the future. Paint tiles! •

Anyone who can follow an outline with a pencil can make tiles that will retain their freshness and beauty a thousand years.

Luxury Life Raft



Photos by Rudy Arnold

15-Man houseboat, complete with roof, gives the comforts of a floating home to survivors of plane down at sea but can be carried like a handbag.

THE overseas airliner slams against a wave, careens high, then pancakes and shudders violently into a swell. Passengers and crew scramble for the emergency exits as the sea spurts into the sinking landplane.

A crash door is yanked open, and a bundle tossed out. In a moment a big "double-doughnut" life raft has ballooned out on a wave, ready to float the first 15 survivors in luxury until they are rescued.

Ditching at sea is far less dangerous with that neatly packaged raft. Bound into that package is the wartime experience of our Army and Navy in flying over wide sweeps

Packed up tight like a valise, the 15-man life raft can easily be stowed on the plane for ready use in a crash.

After dunking at sea, you can sit back and relax under the "double doughnut's" roomy roof till rescue arrives.

of water. Thousands of airmen owe their lives to the inflated bits of rubber enabling them to float up to two months on the open sea.

The first life rafts looked like lopsided inner tubes with thin fabric floors. Overwater flights, however, spurred steady development. Rafts carried today on all overseas airliners are equipped with every need for a forced life at sea, from first aid to fishing.

As the raft is thrown overboard, a handle is pulled to release carbon dioxide stored under 850 pounds of pressure in the Kidde inflation gear, mounted between the two bulkheaded "doughnuts" so that either side of the raft may be used. The force of the expanding gas snaps the protecting cover and thus breaks out the raft.

Safe aboard the raft, the survivors literally "raise the roof." Not only does it guard against one of the worst hazards of life-rafting, exposure to sun, rain, or cold, but the bright color and the elevation of the canopy above the water help searchers spot the craft from afar.

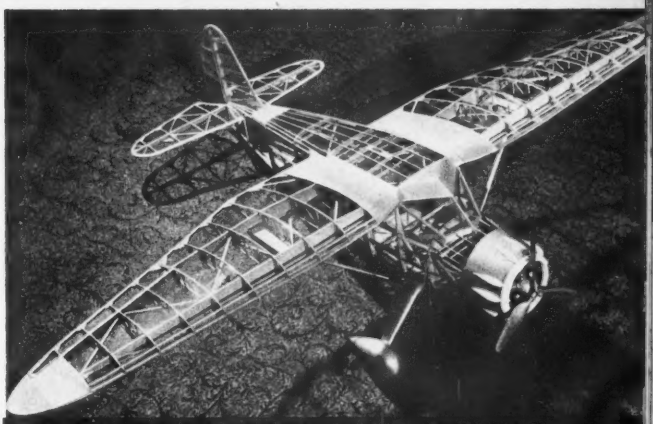
As airliners grow in safety, chances of ditching in the deep become more and more remote. But when you're flying high above that lonely ocean it's still a comfort to know that you can ride out your rescue in de luxe houseboat style. •

Here are the WINNERS in the NATIONAL CRAFTS and HOBBY CONTEST!

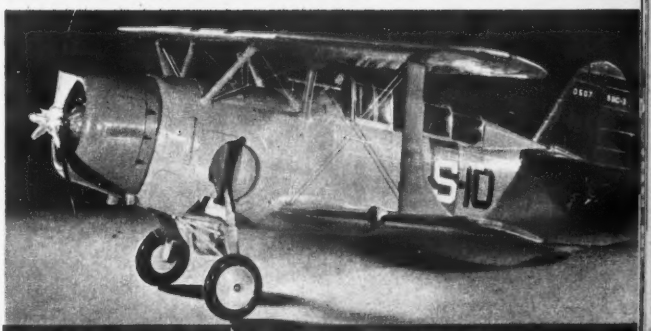
CHECKS totalling more than two thousand dollars, plus handsome trophies, have been sent to the eighteen deserving winners in the MECHANIX ILLUSTRATED National Crafts and Hobby Contest, which was announced in the August, September and October, 1947, issues. In most contests the winners are called "lucky," but in this one the term "deserving" is much more appropriate because the entries as revealed by the submitted photographs clearly showed much skill, craftsmanship, ingenuity and patience.

The contest was divided into six classifications: model airplanes, model boats, model railroads, plastics, home workshop and photography. In each group three prizes of $200, $100 and $50 were offered. Readers in all parts of the United States and Canada quickly deluged the offices of MI with entries: about 10,000 of them! The judges looked at each and every one of them, and, far from growing weary at the task, were continually amazed and refreshed by the workmanship shown in the photographs.

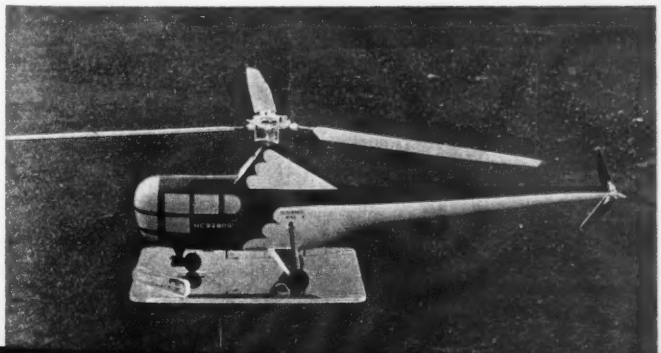
The eighteen prize winners are shown on this page and the four pages following. Contestants who did not win prizes will have to admit,



$200 First Prize, Model Airplanes: W. G. Kruper and E. Navaroli, 1511 Federal Street, McKeesport, Penna., for this exquisite replica of a Stinson Reliant. It features radio control and a five-cylinder Burgess M-5 engine.

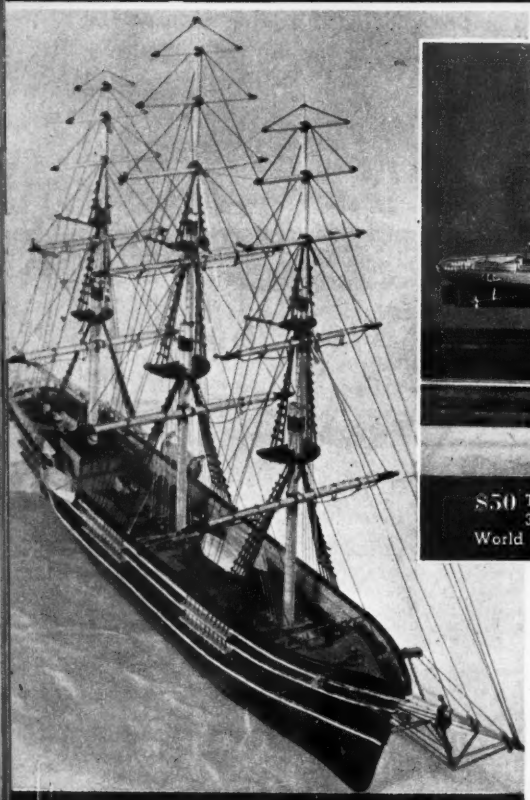


$100 Second Prize, Model Airplanes: Charles G. Bleitner, 4616 Macklind Avenue, St. Louis 9, Mo., for a strikingly realistic exact-scale model of the famous Curtis Helldiver. It represents almost six months of painstaking work.

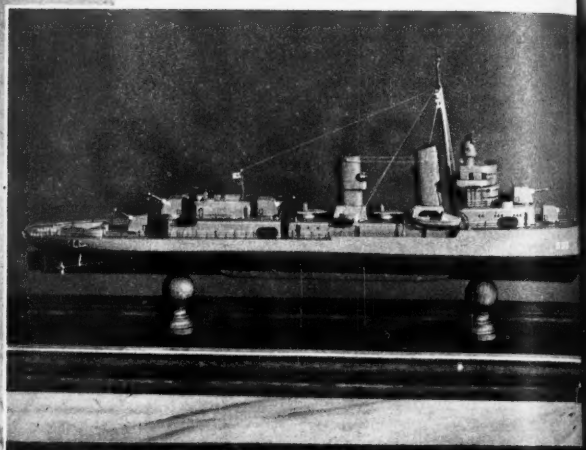


$50 Third Prize, Model Airplanes: John Morelli, 18 Green Street, Waterbury 10, Conn., for this fine reproduction of the wellknown Sikorsky helicopter.

$200 First Prize, Model Boats: Harold Edward Rieck, 1275 Van Antwerp Road, Schenectady, N. Y., for his version of the MI "Bouncie Speedboat," 32 inches long. The deck is laminated of four different kinds of wood. This is an operating model, driven by a 12-volt electric motor.



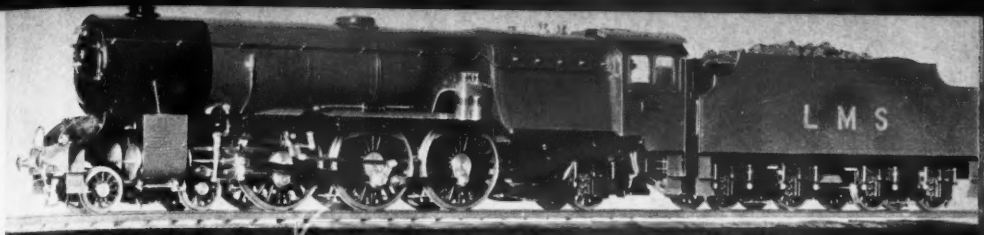
$100 Second Prize, Model Boats: Albert J. Ramm, 8608 Forest Parkway, Woodhaven, N. Y., for this scale model three-master.



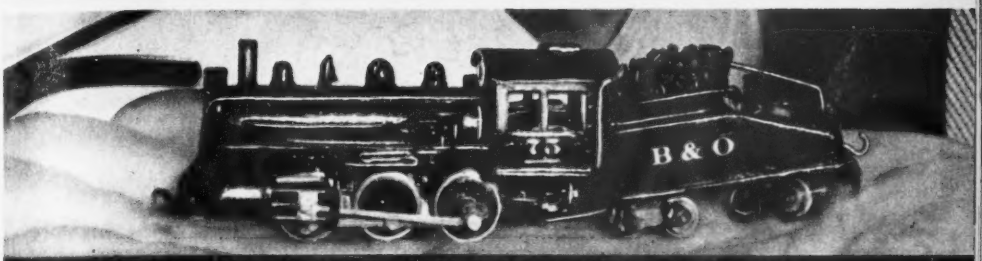
$50 Third Prize, Model Boats: William C. Woellner, Jr., 3918 Odin Avenue, Cincinnati 13, Ohio, for this model World War II sub-chaser, complete with radar antenna.

after looking at these pictures, that the winners unreservedly rate congratulations.

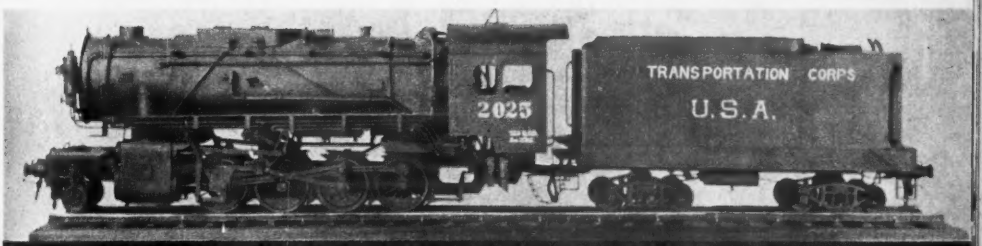
As promised in the original announcements of the contest, all entries accompanied by return postage are being sent back. This is a huge mailing operation because of the large number of individual photos that must be handled, but it is being done carefully and rapidly. Most of the entries will be back in the hands of the senders by the time this issue of MI appears. •



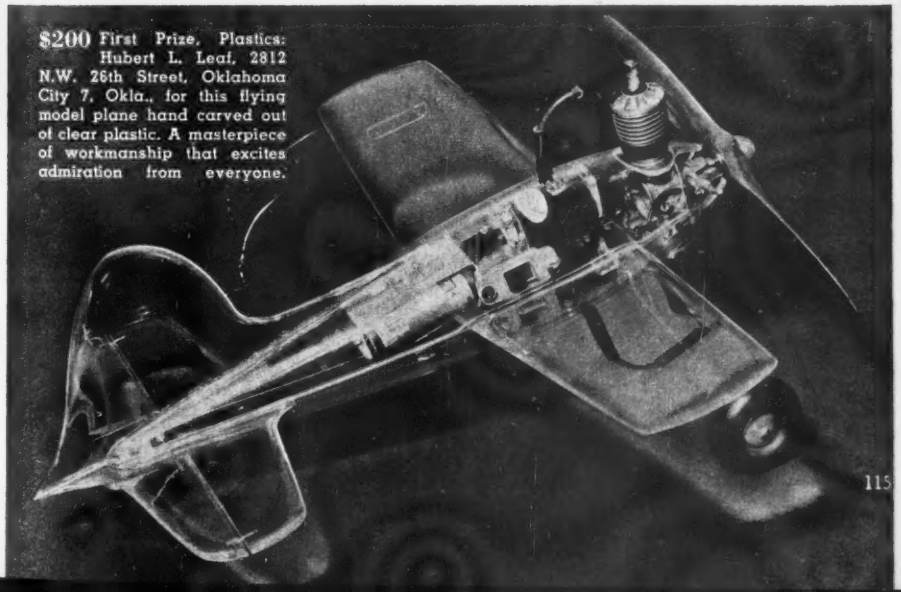
$200 First Prize, Model Railroads: George L. Stevenson, 341 Brixton Ave., St. Lambert, Quebec, Canada, for this five-foot long, 225 pound live steam engine. Everything on it is his own work: this includes patterns for all castings, all the nuts and bolts, etc.!



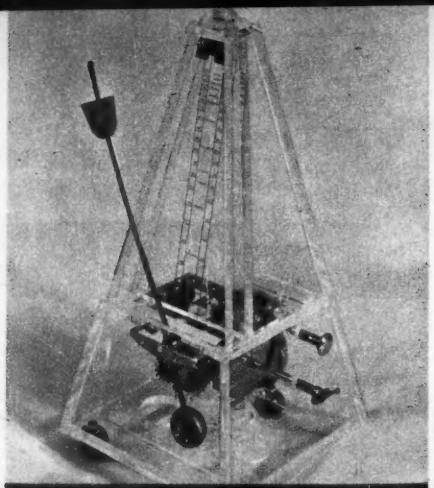
$100 Second Prize, Model Railroads: W. G. Conway, 210 N. Taylor Ave., Kirkwood 22, Mo., for this one-half HO scale engine and tender. Note how comfortably this fits in the palm of the hand. It is made entirely of sheet brass and copper.



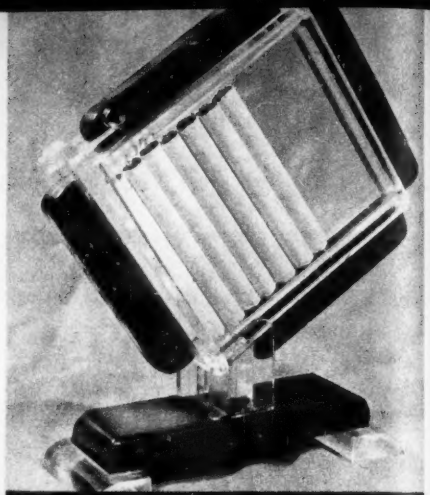
$50 Third Prize, Model Railroads: Merritt C. Becker, Jr., 941 Hidalgo Street, New Orleans, La. This is a faithful 45 inch scale model of a locomotive widely used by the U. S. Army in the European Theatre of Operations during the last war.



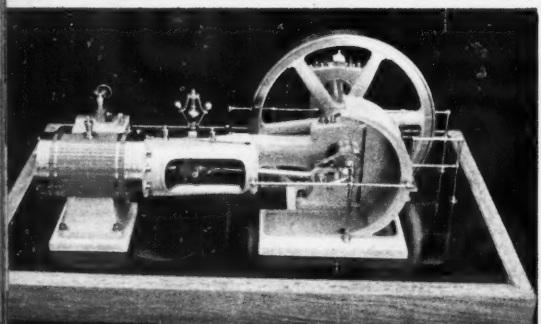
$200 First Prize, Plastics: Hubert L. Leaf, 2812 N.W. 26th Street, Oklahoma City 7, Okla., for this flying model plane hand carved out of clear plastic. A masterpiece of workmanship that excites admiration from everyone.



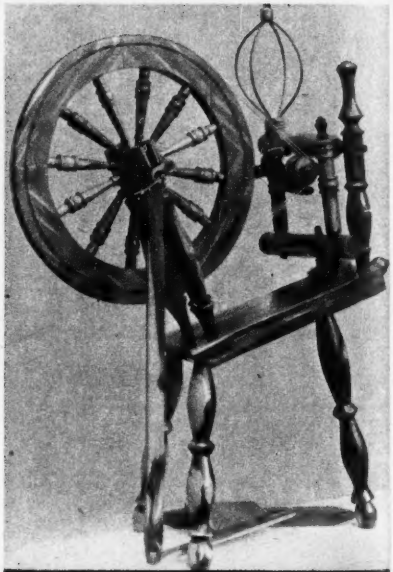
$100 Second Prize, Plastics: Conrad Meunier, 295 St. Patrick Street, Ottawa, Ont., Canada, for this novel metronome. It is made of clear Lucite, 3/16 inch thick. The mechanism was also made by the contestant.



$50 Third Prize, Plastics: Arthur Wolff, 5316 Drexel Avenue, Chicago 15, Ill. Made of both clear and black Plexiglas, with a hinged gate, this cigarette dispenser is very practical as well as ornamental.



$200 First Prize, Home Workshop: Harold Freitog, Box 173, Tappan, N. Y., for the above model of a steam engine used in Europe around 1890. It is 19 inches long, has a flywheel.



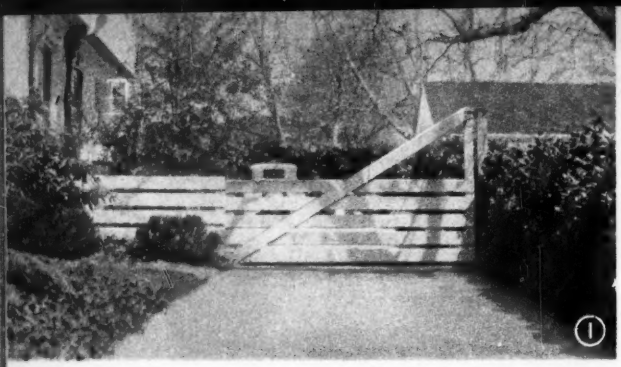
$50 Third Prize, Home Workshop: Kalman Csepi, 51 West Parkway, New Brunswick, N. J., for this operating model of a Colonial spinning wheel, carved from aromatic cedar and finished in clear varnish to enhance the grain.

$100 Second Prize, Home Workshop: Carl Bergmark, 1314—35th Avenue, San Francisco, Cal., for the superb set of hand carved chessmen illustrated at the left.

$200 First Prize, Photography: Dr. I. W. Schmidt, 159-00 Riverside Drive, New York 32, N. Y., for a fine action shot of a photographer who takes his Graflex right into the surf to get his picture.

$100 Second Prize, Photography: Edward R. Lucas, Route 1, Box 533, Poulsbo, Washington. An amusing picture of a cellar-workshop enthusiast working under difficulties on a rainy wash day.

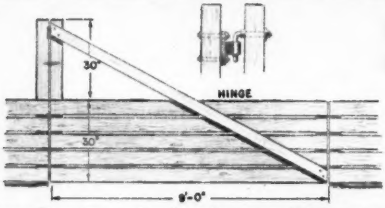
$50 Third Prize, Photography: Robert Graham, 127 Cottage Street, Jersey City 6, N. J., for catching the "do-or-die" expression on the face of a model speed boat fan as he attempts to get his spitting hydroplane under way.



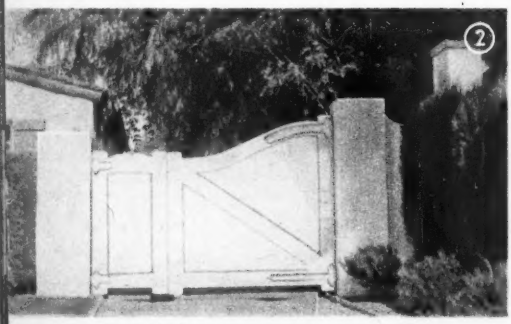
driveway gates

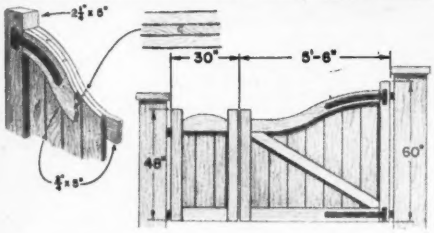
BY RI SIBLEY

Here are seven—pick *the* one that architecturally suits your landscape.



Above: Five fir or pine boards, spaced 1 in. apart and supported by a well-bolted diagonal brace, make this simple and effective sag-proof gate.





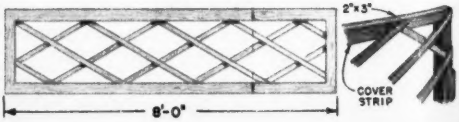
Above: The curved upper sections of the more elaborate designs are best cut on a bandsaw. Wrought iron is a good material to use for the straps.

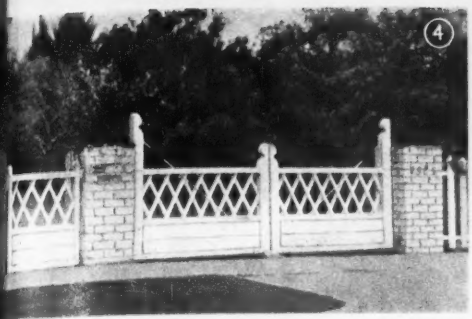
GATES and fences serve two utilitarian purposes. They keep intruders off your property and they prevent small children and pets from wandering away. And they can do more. If wisely chosen and carefully constructed, they can enhance the appearance and increase the value of your home.

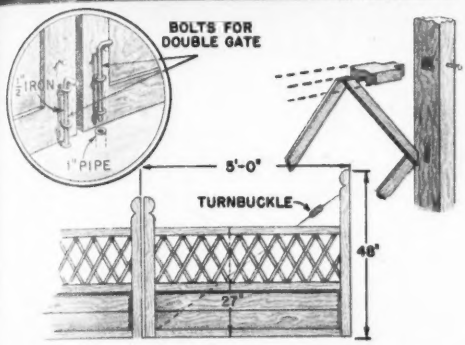
Here are seven driveway gates that are in themselves attractive and comparatively easy to make. But prettiness and simplicity of construction are not the only standards by which a gate should be chosen. Be guided also by the period of architecture of your house and by the neighborhood in which you live. A simple Colonial cottage, for instance, would be ideally complemented by the gates shown in Figs. 1, 3, 4, and 5, but would be overpowered by the one in Fig. 7, which belongs to a much more pretentious place. If your house borders on a busy highway, though, the quaint but uninhibited gate in Fig. 3 probably would be less acceptable than the privacy-affording type shown in Fig. 6. Another gate that blocks off unwelcome stares is that in Fig. 2, which has an additional commendable feature in that it is divided into one big and one little panel, the smaller part serving nicely to admit people on foot.

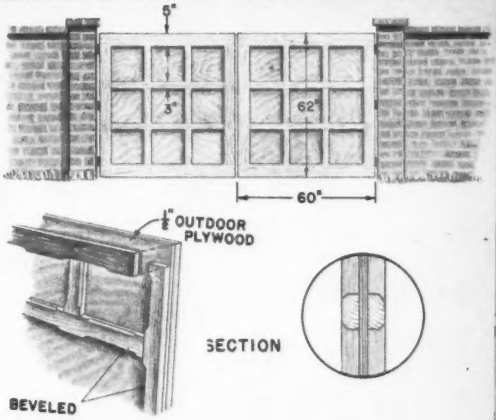
Construction of any of these gates is straightforward and adequately shown in the drawings. You can safely change the over-all dimensions, if necessary, to suit your driveway. •

Left: Simplicity and lightness are the two features of the very popular lattice-work gate. Use a light cover strip to hide the lattice ends, as shown.



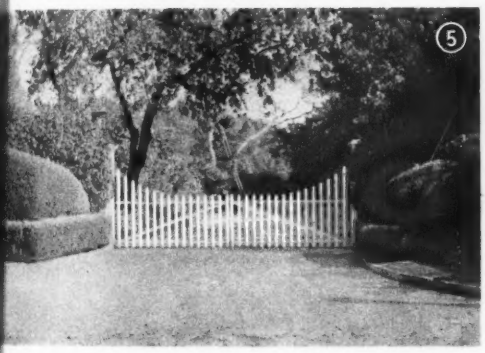


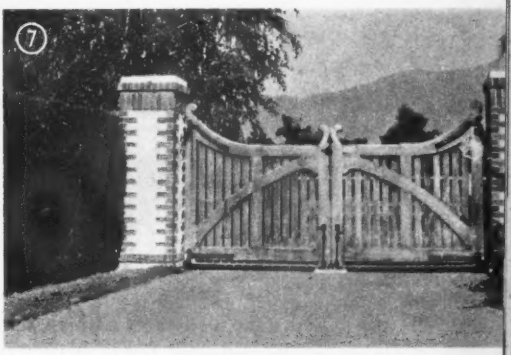




Above: To prevent sagging, steel cables and turnbuckles are used in this design. Set the lattice ends in grooves plowed in the top and the bottom rails.

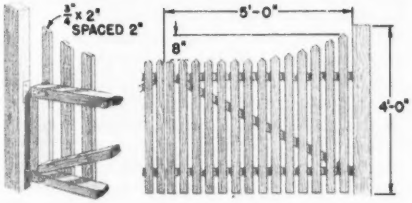
Above: Plywood and false stiles and rails give this gate an air of massiveness, security and privacy that many people will find irresistibly appealing.

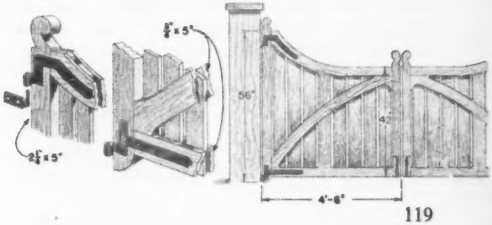


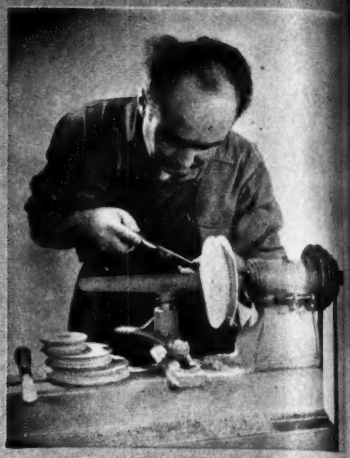


Picket gates are old, familiar friends. Here the top line has been dipped in a graceful curve to prevent monotony in the orderly row of pickets.

This elaborate, high gate will require a little bandsaw work, but is well worth the extra effort for it is sturdy enough to withstand a stampede.







Turning plywood pulleys on the lathe is the best way, but they can also be made with a scroll saw and files.

MIcycle

Plywood "two-wheeler" bridges gap between toddler's tricycle and regular bike.

BY KEN MURRAY

THE younger set really gets a break at an early age with the easily assembled MECHANIX ILLUSTRATED MIcycle. Early bike training is like early flight training—it instills a sense of balance at the age when it is most easily acquired. Also, with the seat of his pants only about 18 in. from the ground, the trainee does not have far to fall, so his early fears are quickly conquered. He will be ready to change over to a regular bicycle as soon as his legs are long enough to reach its pedals.

Micycology, or the science of building a miniature cycle from the accompanying M. I. plans, is downright easy. The trainer is constructed mostly of strong, modern resin-bonded ¾ in. plywood.

The plywood pulleys are best turned on the lathe, but if you lack power-tool equipment, the job can be done quite satisfactorily with a scroll saw for cutting the round discs and several files for grooving them. With a pulley temporarily mounted on a shaft clamped to the edge of the workbench, cut a starting groove in the edge with a rough round file, and finish with a V-shaped file.

An added feature can be given to your MIcycle by using a pair of driving and a

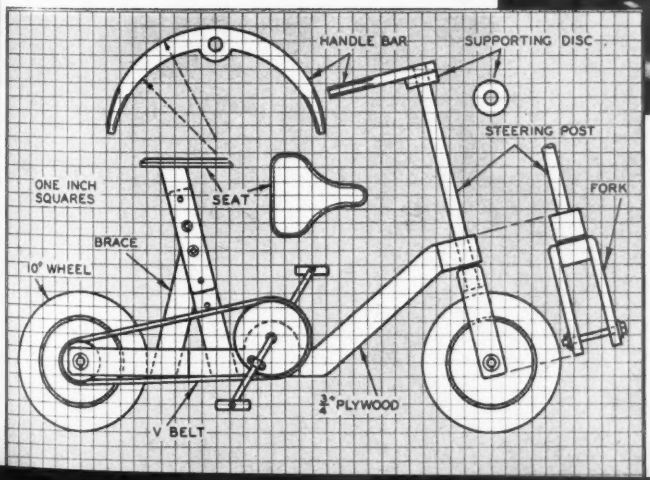
Coating the pulley grooves with plastic glue, left, provides hard, firm-wearing surfaces. Center, a bracket secures pedal shaft to driving pulley. Right, cut mounting-disc center out at an angle.

At right, the mounting disc and driven pulley are being fitted to the 1.75 x 10 in. rear wheel.

pair of driven pulleys, four in all. Then, by merely changing the V-belt from one set of pulleys to the other, the drive will operate either at low speed (with lots of power) or at high speed (with less power). Of course, mounting the additional pulleys will make it necessary to increase the width of the rear-wheel frame by ¾ in.

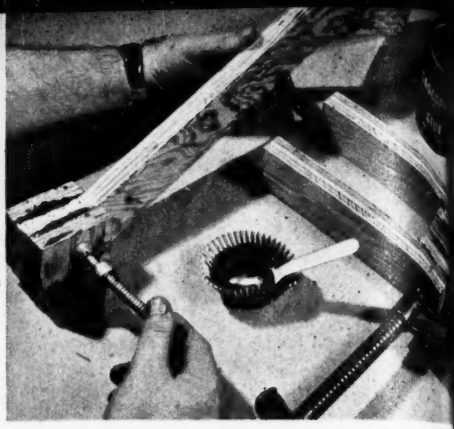
Pulley grooves should be surfaced with a hard coating of resin glue that is diluted with one-half part of denatured alcohol so it will penetrate well into the wood. A small metal clamp is screwed to the drive pulley in order to secure the bent portion of the pedal shaft and transmit motion to the belt.

The pedal shaft consists of a length of iron rod having two bends in it. The second bend will ordinarily have to be made after the pulley and shaft are in place in the MIcycle frame. An alternative



When boring frame members to take the pedal shaft, above, clamp together in your vise and bore both at the same time. This will guarantee good alignment. The drawing at the left is placed on 1-in. squares to ease your task when taking off required measurements.

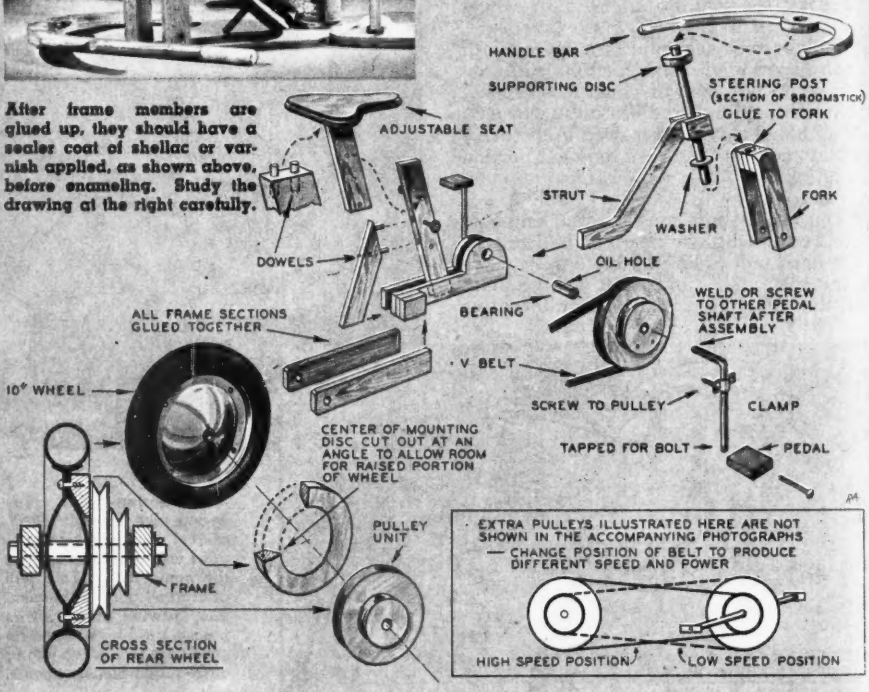
Rounding off edge of the wood seat. A coarse file or sandpaper can also be used for this.

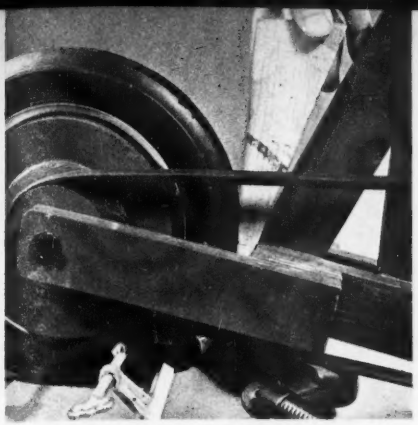


When gluing frame sections together, use a good grade of resin-base glue and plenty of clamps.

After frame members are glued up, they should have a sealer coat of shellac or varnish applied, as shown above, before enameling. Study the drawing at the right carefully.

method is to make the shaft in two pieces, bolting them together after tapping and threading. When a small welder is available, the two parts can be joined as shown on page 123. Where the shaft passes through the wood frame, a short piece of metal pipe will make a suitable bearing. It should be drilled for lubrication with ordinary petroleum jelly or automobile





To tension the V-belt while the glued assembly dries, wedge the wheel away from the frame

Welding the pedal-shaft assembly. It can also be tapped and threaded, or made in one piece.

lubricant of a medium grade.

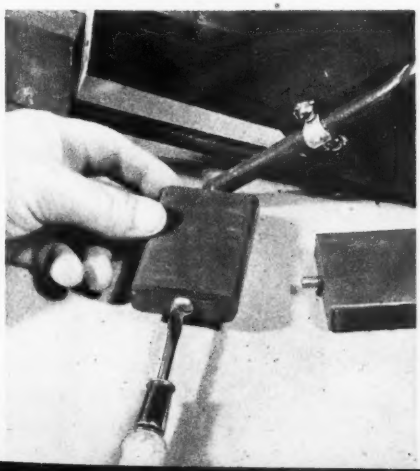
The wheels in the prototype are Osborn 1.75 x 10 in. semipneumatics with ½ in. ball bearings. A mounting disc is required for attaching the driven pulley to the rear wheel. The inside of the disc must be cut out at an angle so it will fit over the raised portion of the wheel. Drill the wheel in four places for attaching the disc with screws. As the wheel is already provided with fine lubricated ball bearings, the ½ in. shaft needs merely to be pushed through the wheel and the two horizontal plywood forks, retaining the drilled ends with washers and cotter pins. The identical method is also used for mounting the front wheel between forks.

The two frame members that support the pedal shaft and drive pulley are glued to the two rear-wheel forks. For flexibility, this model uses a single plywood strut between frame members and the front fork.

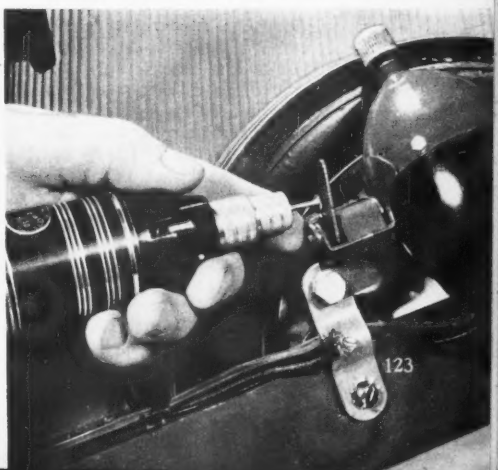
The seat assembly consists of an upright support, a brace (which are doweled together for greatest strength), and a plywood seat, which is also doweled to its supporting member. Holes are drilled so the parts can be adjusted for height. Round all sharp edges of the seat or else upholster with cotton-waste padding and artificial leather.

Glue up the forward fork; then drill it to take a length of broom stick, which forms the steering post. Glue the post securely in place. After drilling the block at the front of the forward strut, slip it over the post so that it will rest on the top of the fork. The latter must be trimmed by sanding the corners so it will turn easily. This can be facilitated by facing the two contacting surfaces with sheet metal, or by using large metal or fiber washers. In the model shown, however, the surfaces were merely sanded smooth, well [*Continued on page* 156]

Bolt the pedals to the tapped pedal shaft with good-sized round-head machine screws or bolts.



As described in the text, the generator bracket must be notched so it can ride clear in daytime.



MI Staff Photos

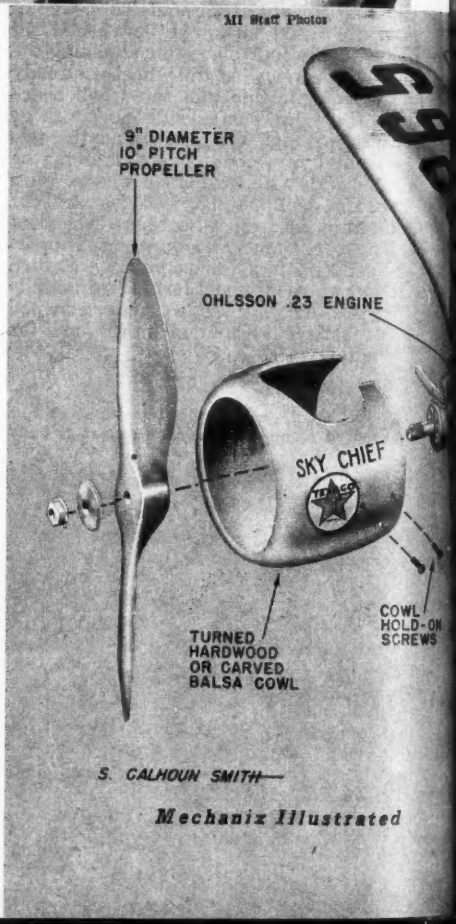
Frank Hawks' Sky Chief

Like it? Then build this 32-inch exact scale control-line version of the famous Northrop Gamma. Power with any .19 to .49 engine.

BY WALTER A. MUSCIANO

BORED with the unrealistic appearance of the present free-flight gas jobs? Tired of control-line "speed demons"? The author was and decided to combine scale appearance, good looks and realistic flying into his next project. The task was not an easy one because most good looking, low wing models have so little wing area they fly much too fast for real enjoyment—and safety. After examining scores of old time designs, the Sky Chief was selected because it fulfilled every requirement. The author's model has, to date, placed first in two beauty contests.

The Sky Chief was designed and built by John Northrop in 1930 for the late Frank

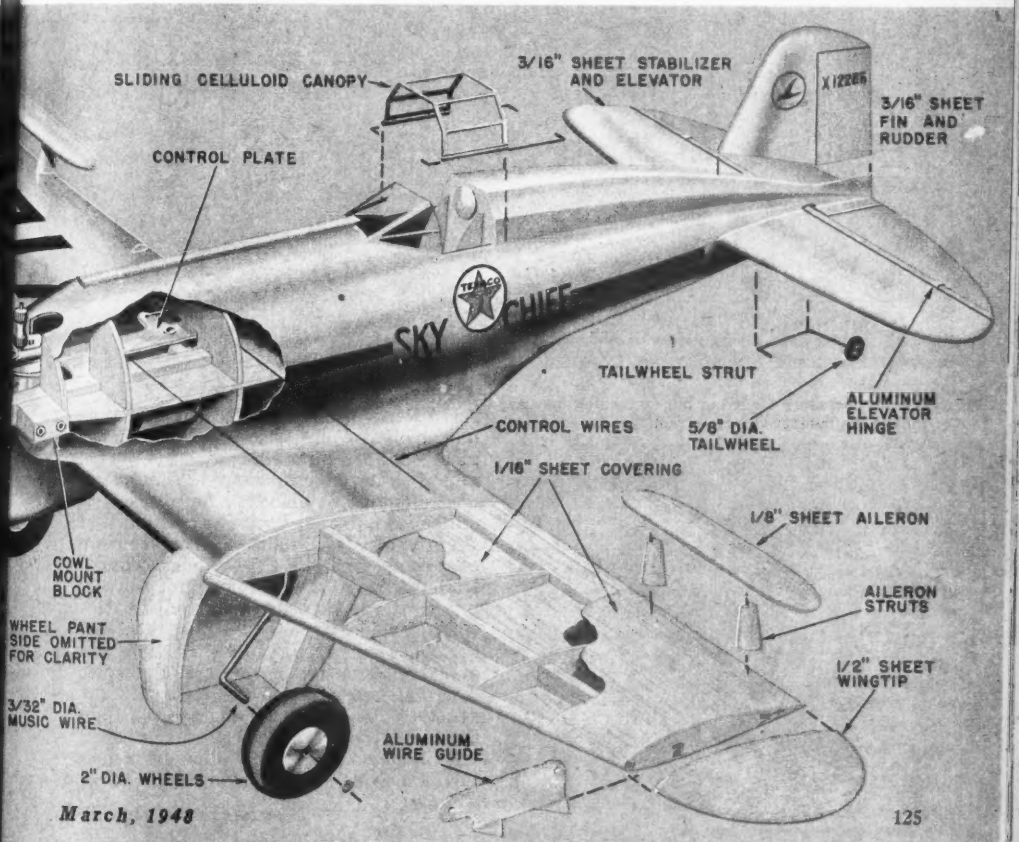


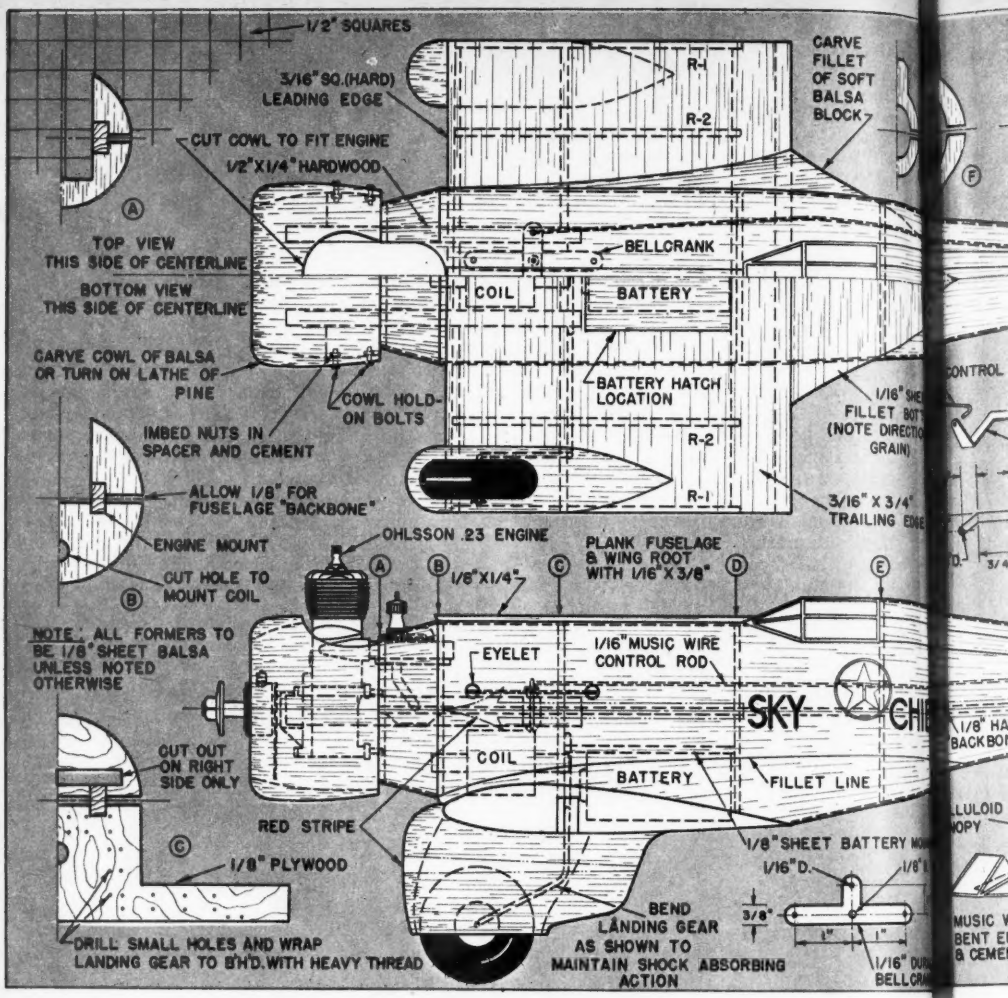
M. Hawks who was superintendent of the Aviation Division of the Texas Company. The craft was appropriately named "Texaco Sky Chief," although the manufacturer called it the Northrop Gamma. As a result of its careful streamlining, many inter-city speed records were established and the Sky Chief, with Hawks at the controls, became one of the hottest airplanes of that era. A twin row, fourteen cylinder Wright R-1510 engine of 700 horsepower drove the ship at over 200 mph—but the landing speed was a mere 42 mph! This alone reflects the sound aerodynamic design incorporated in all Northrop aircraft. The range of the Sky Chief was over 2,500 miles. Commander Hawks was not alone in his praise of the fine ship. Lincoln Ellsworth, Jacqueline Cochran, Howard Hughes and Jack Frye are a few of the notables who recognized the Gamma's superior performance. The Douglas A-25 and SBD-1 and the now obsolete Northrop A-17 were evolved from this design. In fact, a few Gammas are still flying!

The model was designed to combine lightness with strength. This was achieved by using the backbone-former planking method of construction for the fuselage and heavy spar and ribs plus sheet covering for the wing. Pants and tail surfaces are built up from soft balsa because they are not subject to stress.

Full size plans are a must and may be obtained by sending 50 cents to the MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Order Plan No. 386. The plans show in-

Three-quarter rear view. Note the rudder is offset to insure model flying "against the circle."

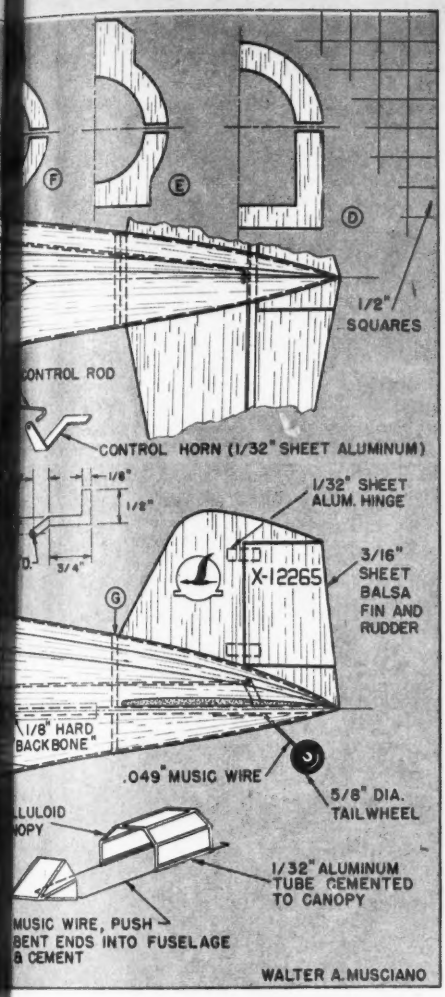




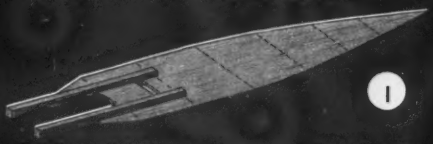
It's not necessary for flying but the sliding canopy makes the model even more realistic. Note details.

stallation of the Ohlsson 23 engine but any power plant from .19 to .49 cubic inch displacement can be used. Naturally, the nose must be altered accordingly. When using a larger engine, it also will be necessary to either move the battery position back slightly or else obtain the correct center of gravity position (½ in. back from the leading edge of the center section) by adding a little lead to the front bulkhead.

Start construction by cutting the fuselage backbone from ⅛ in. sheet hard stock and then glue the engine mounts in place. The distance between the mounts is governed by the size of the engine used. While the cement is drying, cut out the bulkheads and formers and attach. Follow by cementing the wing root leading and trailing

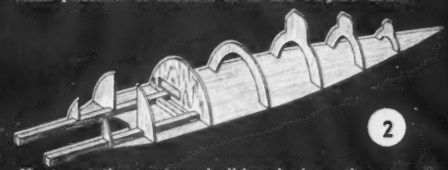


FUSELAGE CONSTRUCTION



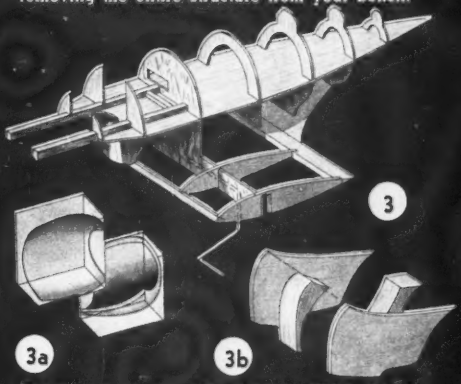
1

Cut the crutch from hard 1/8 in. sheet stock and cement the motor bearers in place. If necessary, shift position of mounts to fit the engine used.



2

Next, cut the various bulkheads from the prescribed stock and cement securely in place. Allow the cement to dry thoroughly before removing the entire structure from your bench.



3

3a 3b

Cut out the lower section of each bulkhead and cement securely in place. Proceed to build up the center section after which time the outer wing panels may be added. 3a shows method of carving the cowl. 3b shows manner in which the landing gear wheel housing is constructed.

edges and ribs in place after the landing gear is secure. It should be noted that the wing root is built integral with the fuselage. The stabilizer and elevator are attached next, followed by the control mechanism and ignition. The elevator hinge shown on the plans is much neater and stronger than the more conventional cloth hinge. In order not to spoil the realistic appearance of the model, the booster jack connections and the switch are located under the center section of the wing. The batteries are accessible through the 1/8 in. sheet hatch located on the bottom of the fuselage. This hatch is held in place with large dress snaps. Plug type batteries were used on the original and are recommended. Bright Star, Burgess and General all manufacture a battery that can be used. All wiring connections should be well soldered and the ignition system tested before the model is covered. The fuselage and wing root are planked with $\frac{1}{16}$x3/8 in. balsa strips.

Building the outer wing panels is next. Allow the wing spar to protrude from R-3 in order to insure a good joint between the center section and wing panels. Most of the

FULL SIZE PLANS

of this model are available by sending 50 cents to: MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Specify Plan No. 386.

Front underside view. Note ignition switch beneath fuselage; line spreader on tip.

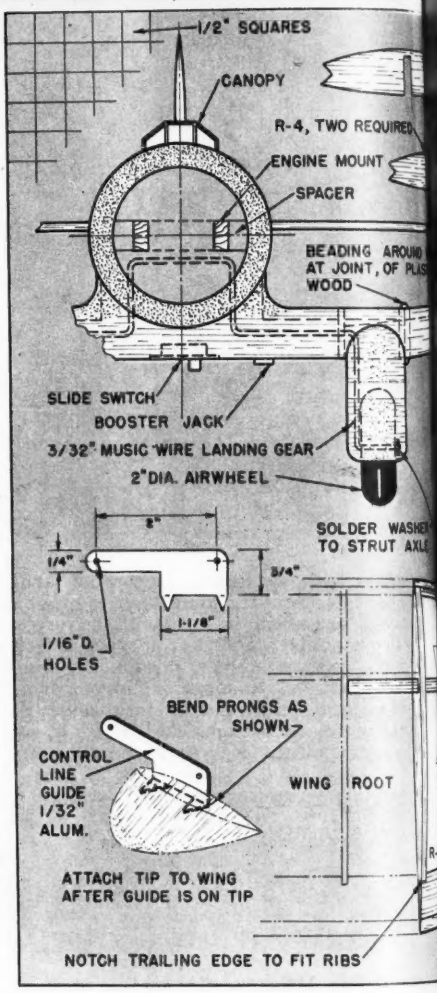
panel can be covered with a $\frac{1}{16}$x3 in. sheet balsa and the remainder planked with scrap $\frac{1}{16}$ in. thick strips. Be sure to cement the covering well to the framework. Making the large wing fillet appears to be more difficult than it actually is but you shouldn't encounter any difficulty if you take your time. A soft balsa block is used for each fillet. The $\frac{1}{16}$ in. sheet bottom of the fillet will act as a guide to secure the proper outline. The leading edge fillet is also carved from small soft balsa blocks. Rough-carve the fillet with a gouge and finish with sandpaper.

When the entire covering is complete and well sanded, the wheel pants may be added after the wheels have been mounted on the struts. The wheel housings are made from $\frac{1}{8}$ in. sheet covers on a 1 in. thick center core. At this time the outer wing panels are cemented to the wing root, taking care to duplicate the indicated dihedral angle.

The fin and rudder are cut from $\frac{3}{16}$ in. sheet stock and each surface trimmed and sanded so a symmetrical airfoil exists. The cowling can be either carved from two balsa blocks, as shown, or lathe-turned from a white pine block. The spacers are made of hard balsa and are cemented to the engine mounts. Small bolts hold the cowl in place.

"It's the finish that counts" is a phrase appropriate not only to sports but to model building as well. If you're after a really smooth professional-like finish here's the procedure.

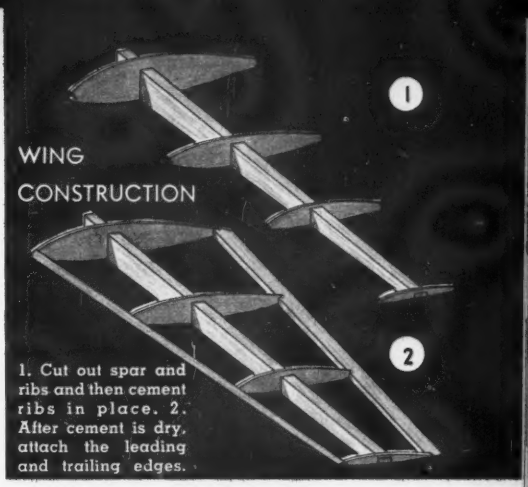
First apply two coats of clear dope, sand the surfaces lightly and then cover the entire model with light-weight Silkspan, using dope as an adhesive. The tissue covers the pores of the wood and also contributes greatly to the strength of the ship.



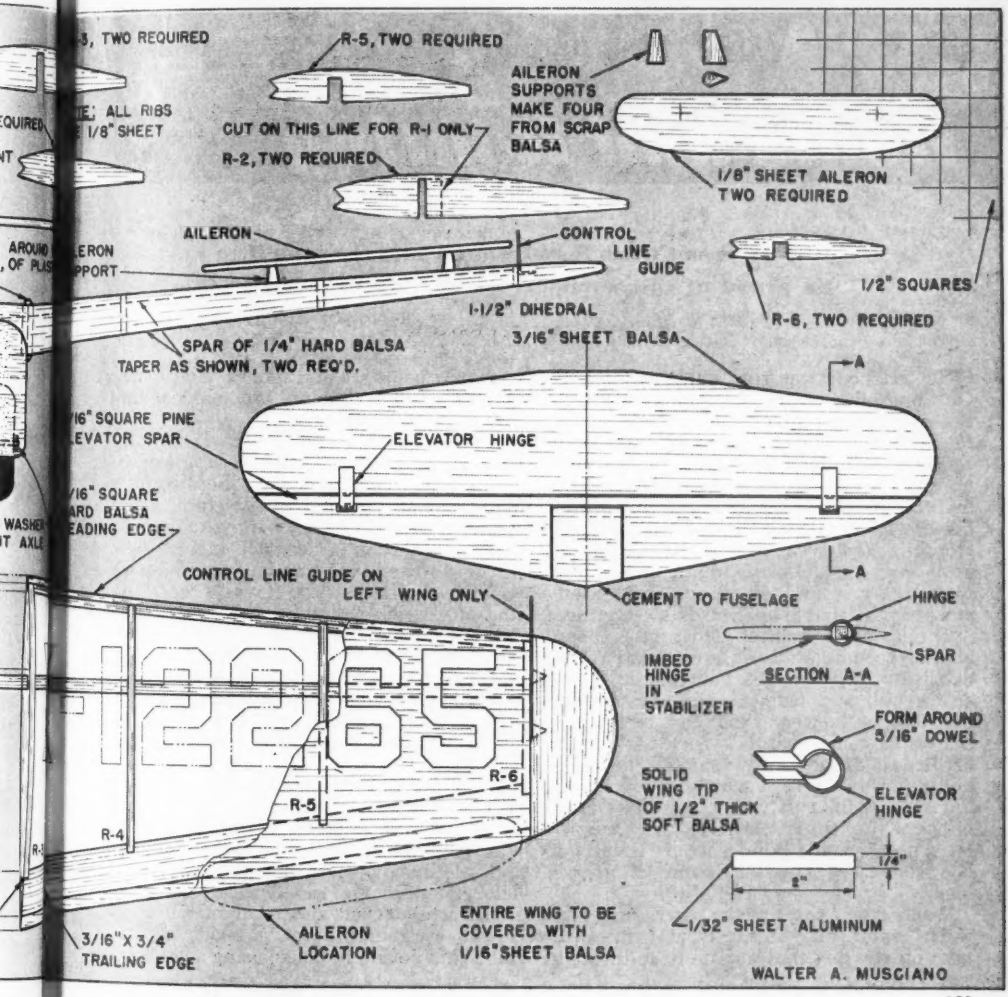
Five to ten coats of thin clear dope will leave a smooth surface for the colored dope.

The prototype Sky Chief was finished in natural aluminum with a red fireman hat and striping and black lettering. A good grade of aluminum dope should be used on the model and applied quite thin, using as many as twenty coats if necessary to obtain a glass-like finish. If a spraying outfit is available, by all means use it. Wait at least twenty-four hours after the last coat has been applied and then rub down the model with a good rubbing compound. Speedite 600 is recommended.

The sliding cockpit canopy can be added at this time. The frame of the canopy is made of silver cellulose tape cut into strips of the proper [*Continued on page* 158]



1. Cut out spar and ribs and then cement ribs in place. 2. After cement is dry, attach the leading and trailing edges.



Painting in the boottopping, a typical fitting-out chore. A steady hand is a big help.

Boats and Boating

It's fitting-out time. If you want a boat that you'll be proud of this summer, do the job properly.

BY WILLIAM F. CROSBY

TO THE boatman spring means just one thing—fitting-out time—and although the work may involve hours of really tough, backbreaking labor and mean sore muscles and lame backs, your boatman knows that his efforts will be reflected by the amount of pleasure he will get out of his life afloat during the coming summer months. Each year sees newcomers hard at it and quite usually doing things the wrong way 'round. It is for these men, and women, that these words are written.

The inside of the boat comes first. Clean all the accumulation of leaves and other debris out of the bilges, going through the entire hull and using a little dustpan to pick up your sweepings. Put them in a bucket as you go along. When the bucket is filled, take it off away from all the boats and dump it where it won't blow back on any fresh paint. If your engine has been out over the winter, clean out the accumulated grease and oil under where it will go. Kerosene will cut this skim of grease nicely.

Wash down the interior with soap and warm water. If you must paint, this will take off the dirt that might strike through your new paint job and spoil it. And sometimes a good scrubbing will make it unnecessary to paint at all.

Where varnish work shows a scaly appearance, you really should scrape down to the wood. On mahogany there may be black stains. No amount of scraping will take these out. The only thing to do is to paint the surface or replace it with new wood. In preparing oak for varnish, don't leave the job until you have at least one coat on, as oak will stain badly if scraped and left bare.

Canvas decks should be washed, sanded, and then painted with one fairly thin coat. Thick paint makes canvas crack and once a crack starts, there is no way of getting rid of it except to put down new canvas, a major job.

Wash the topsides with soap and water, also, before doing any sandpapering. If you don't, the rubbing of the sandpaper will simply grind the dirt into the old paint and it will show up through the new paint before long. On small boats, if new caulking is needed, don't hammer it in as if you were caulking a canal boat. Instead, roll a thin strand in place, using a caulking

wheel. Put paint in the seam before you roll in the caulking to make it stick better. A good way to find out whether or not your caulking cotton is in bad shape is to pull out a little. If it looks black, the fibres are probably rotten and it should be removed and new stuff put in. When you caulk the seam, keep the caulking below the surface to give room for seam filler. Finish off the seam so that it is slightly hollow. When the wood swells, this will level up. If there are digs in the planking, get some trowel cement and put it in the holes with a putty knife. When all this work is done, sand everything down smooth and apply your paint. Remember, thin coats are better than heavy ones.

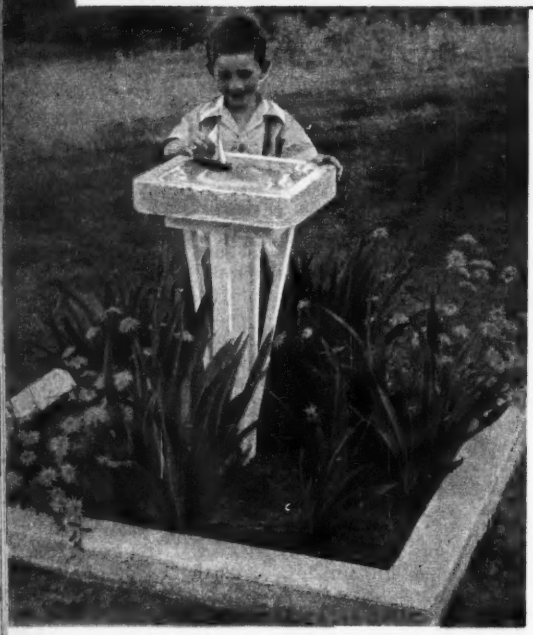
Carefully check the bottom for potential leaks, not only at the seams but also at the plank butts and around any hull openings. Caulking should be replaced as necessary and seam composition put in the seams. If some of them appear to be wide open, don't jam them full of stuff, but just fill sufficiently so you can get on a smooth coat of bottom paint. When she gets in the water, the wood will swell and take up the slack.

Brief pointers. Don't go for a sail in your boat until she has had several days to swell up properly. Don't varnish or paint wire rigging. If the old galvanized rigging is done for, replace it. Don't put antifouling paint on bronze or brass propellers, rudders, etc. To paint galvanized hardware, use a mixture of aluminum dust and spar varnish for the most lasting finish. Be sure to put new graphite-impregnated packing in the stuffing box. Don't use shackles on the mooring line unless they are securely wired in. Constant working of the line will loosen up a shackle and eventually may set your boat adrift. If the mast is equipped with a track or slot for the sail, be sure to keep varnish away from either. There is nothing worse than a sticky sail slide. Be sure your gasoline deck plate is connected to the tank with an air-tight pipe to prevent gasoline fumes from escaping and causing an explosion.

Every year a number of motor-boats are ruined because this simple precaution is overlooked. Gasoline fumes, being heavier than air, will settle in the bottom of the boat, where they will lie ready and waiting for a spark that will set them off. The Federal law for motor-boats requires proper ventilation of both engine and tank compartments. This is best achieved by ventilation pipes running down all the way to the bilge in all four corners of the engine room, connected with cowl-type ventilators on deck.

Further protection in the engine room should be provided by having a flame arrestor on the air intake of the carburetor; by installing the storage battery in a ventilated, lead-lined box, protected by a cover, to prevent a tool or metal object from falling on the terminals and causing a flash; and by putting a shut-off valve on the gasoline fuel line near the carburetor. •

concrete BIRD BATHS



Rounded corners and a graceful wooden pedestal make this bird bath a thing of beauty forever.

BY MICHAEL LIGOCKI

These simple projects are decorative, lend distinction to garden.

DECORATIVE bird baths for your garden can quickly be made from concrete. No elaborate molds are needed and, except for the time required to allow the concrete to set properly, an entire bath can be made in an afternoon.

Two different designs are shown—one has rounded corners and a wooden base while the other is octagonal in shape and has a concrete pedestal. The first step in making either is to nail up a 3 x 16 x 16 in. (inside measurement) box, using 1 in. stock for the sides and ¼ in. plywood for the bottom.

For the round-cornered bath, form the corners of sheet metal, shaping them around a mason jar or a small tin can. To make the water cavity, nail a chamfered wood block, ¾ x 12 x 12 in., to the bottom of the box; then center an inverted pie tin or old dinner plate on this block and fasten it in place. Before pouring the concrete, space four bolts over the form, suspending them on strips of wood so their heads will be embedded in the concrete deeply enough to stay firmly in place after the concrete is dry.

To make the concrete, mix one part of cement, two parts of sand, and three parts of gravel; then gradually add water until the mixture is just wet enough to pour. Coat the inside of the form with oil or grease to prevent sticking and pour the concrete, taking care to fill all nooks and crannies. Gently tap the sides of the form from time to time while pouring to prevent air pockets from forming. Leave the bath in the form for 48 hours; then carefully remove it and smooth down the rough edges with a piece of emery cloth.

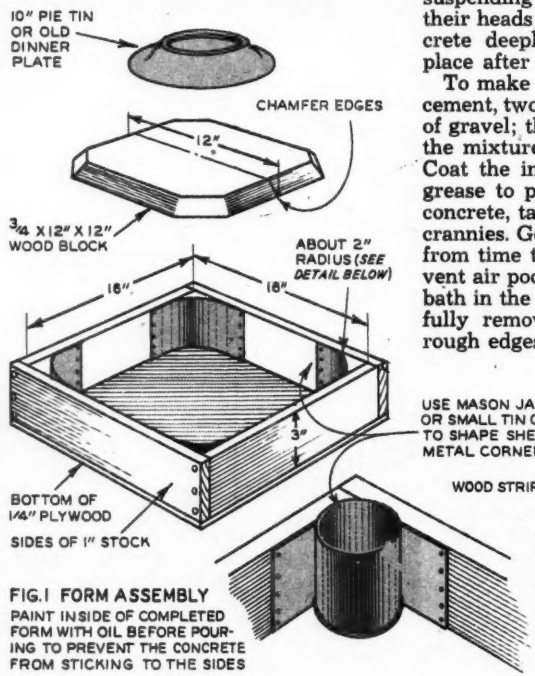


FIG. 1 FORM ASSEMBLY
PAINT INSIDE OF COMPLETED FORM WITH OIL BEFORE POURING TO PREVENT THE CONCRETE FROM STICKING TO THE SIDES

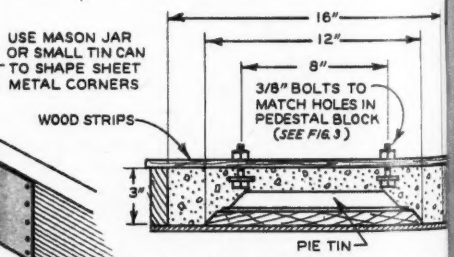
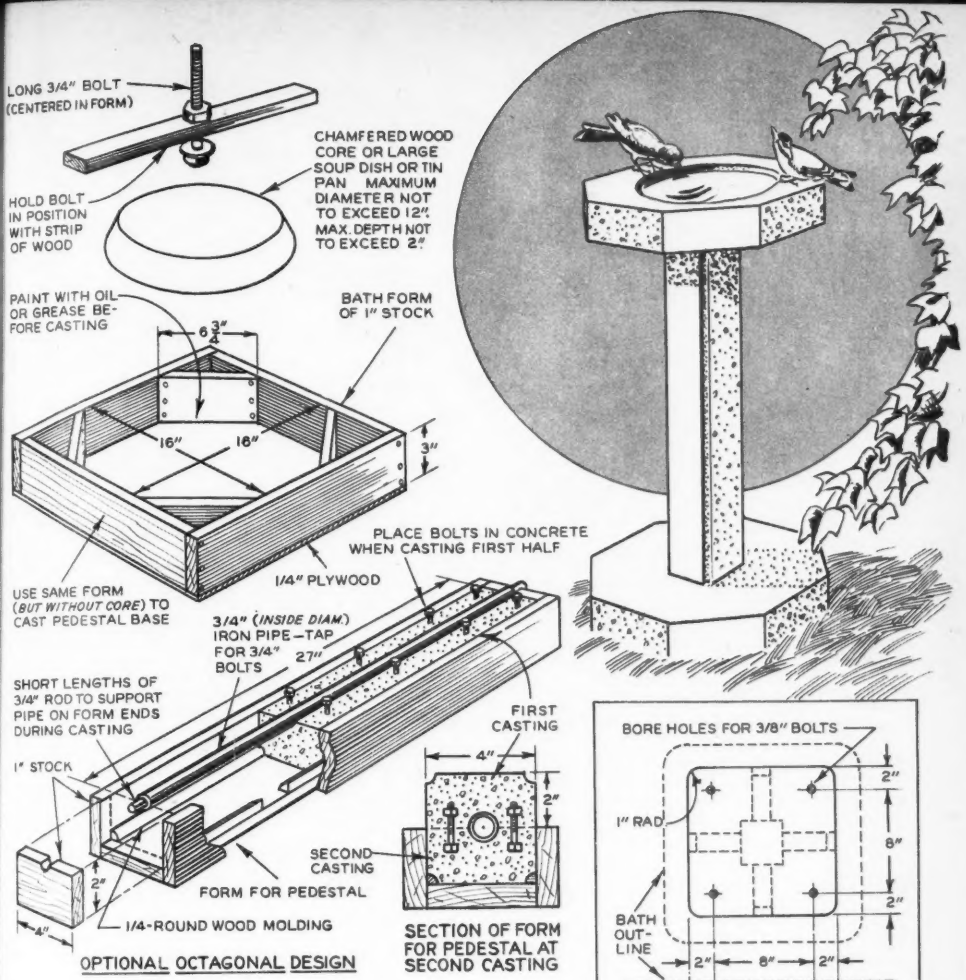


FIG. 2 SECTION OF INVERTED CASTING
CONCRETE IS POURED INTO FORM IN THIS POSITION WITH BOLTS SUSPENDED IN FORM



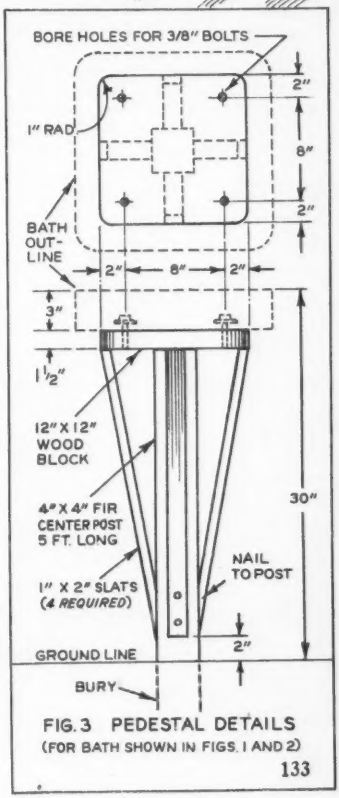


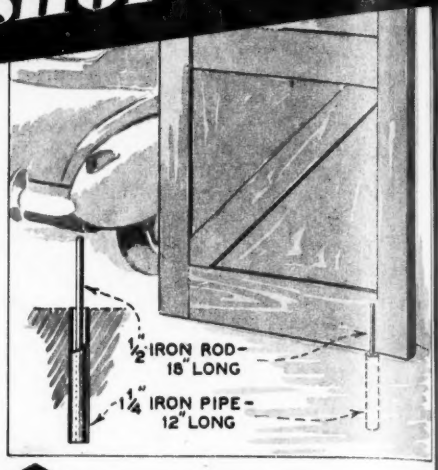
FIG. 3 PEDESTAL DETAILS
(FOR BATH SHOWN IN FIGS. 1 AND 2)

For the pedestal center post, use a piece of 4 x 4 in. fir, 5 ft. long. Square one end to support a 1½ x 12 x 12 in. wood block that has four bolt holes bored in it. Screw this block to the post and nail four slats in place, as shown. Coat the lower portion of the post with creosote and bury it in the ground. Paint the part of the pedestal above ground and bolt on the bath.

The corners in the octagonal bath are formed by end-chamfering 1 x 3 x 6¾ in. wood pieces and nailing them in place. Use a wood core, soup dish, or tin pan for the water cavity. The bath is held to the pedestal by a ¾ in. bolt that threads into the center-post pipe core. After making the bath, remove the water-cavity mold and pour a duplicate piece for the pedestal base. The center post is cast, one half at a time, in a wood trough, as shown. Complete the first half and remove it from the form; then pour the second half and place the first atop it with the bolts down so they extend into the still soft, setting concrete. •

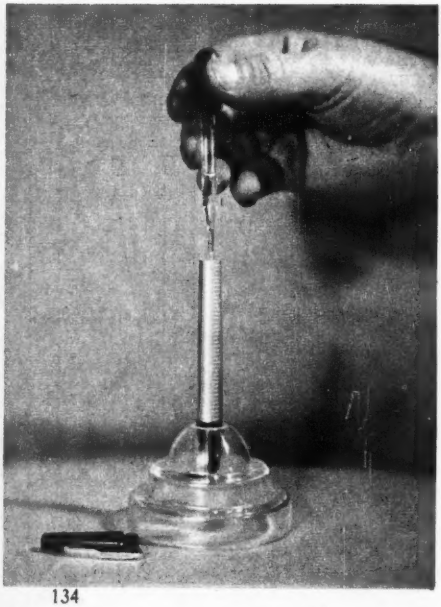
HOME AND SHOP KINKS

SCALING FISH can be a tough job without the proper tool, but this simple scale remover is really efficient and takes but five minutes to make. Just nail three bottle caps to a stick, clinch the nails, and go to work on your fish.

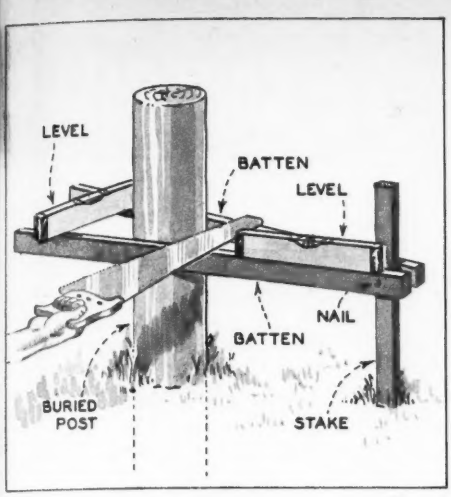


BARN AND GARAGE DOORS of the hinged type have an annoying habit of swinging shut just at the wrong time, especially on windy days, unless they are held open in some way. One method of doing this is to sink 12 in. lengths of pipe in the ground, open the doors, and drop 18 in. pieces of rod in the pipes. The rods will stick up just far enough to prevent the doors from swinging closed.

LIGHTER FLUID IMPROVES BALL PEN. Some pens having ball points do not write consistently or uniformly because the ink is too heavy. The ink will feed to the ball more evenly if you place two or three drops of lighter fluid in the barrel to thin it. Wait for a couple of days for the fluid to work down all the way through the ink to the ball point.

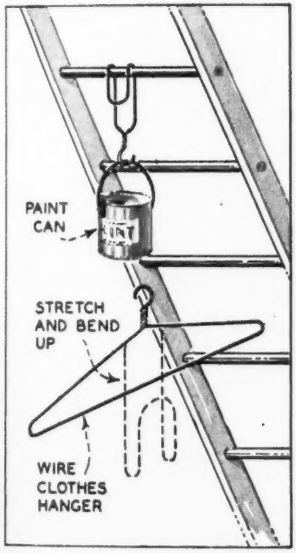


TO PREVENT RECORDS in albums from slipping out and breaking when being carried from place to place, thread a piece of stout string through the holes in the records and tie the two ends together at the bottom of the album, as shown, using a bow knot so string can be easily removed and reused.



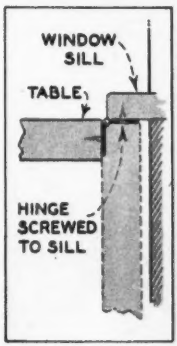
FOUNDATION AND FENCE POSTS can be sawed off square and true by constructing a temporary saw guide at each post. The guide is made from two battens that are nailed to the post and leveled off and a driven stake to support them. The saw should rest on both battens throughout the cut.

PROTECT THE BARK on your shade trees while mowing the lawn by making and using the guard shown above. It consists of a short length of old automobile casing that is slit lengthwise. After using it on a tree, move it to the next one and trim around the first with ordinary grass shears.



WHEN PAINTING from a ladder, the safest policy is one hand for yourself and the other for the brush. This leaves none for the necessary paint can. It, however, can be hung from a wire clothes hanger that is bent to the shape shown dotted above.

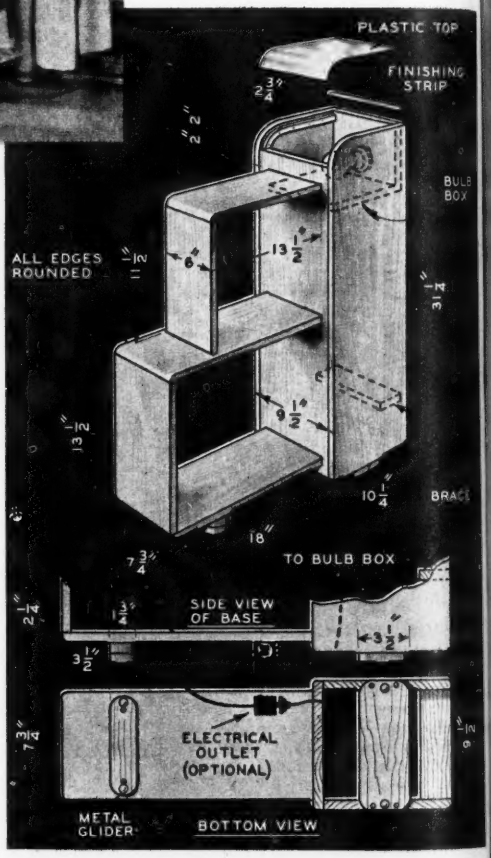
IN A SMALL KITCHEN a snack bar is usually an unattainable luxury. Here's an idea, though, that makes it possible. Simply hinge one side of a table top to a window casing and attach two folding legs to the other side. Use folding chairs to sit on.



illuminated VASE *and* BOOKCASE

Something different in a corner "lighter-upper" that combines glowing Lucite with blond wood.

BY ROBERT L. HOPPOUGH



THIS charming bookcase with illuminated top can be easily constructed without any fancy power tools. The light coming up through the curved Lucite or Plexiglas top to highlight the family's objects of art will probably extract a flock of compliments from your friends. Sit back if you like and admit that you're a smart craftsman. Actually, curving the plastic is one of the easiest tasks in building this unit.

Fourteen feet of clear pine, 1x10 in., will be sufficient. The pedestal dimensions shown on the diagram can be varied slightly, depending on the width of your boards. The front board of the pedestal is fastened to the sides by means of six brass or steel angles. Be sure the screws you use do not project into the outer surface.

Screw the metal corners to the side boards first. Set the corners back from the front edge of the side boards slightly so that the faces of the corners will not quite touch the front board. This permits you to draw the front

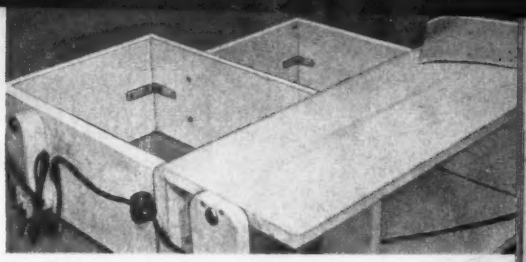
board up tightly after you've carefully applied a thin coating of glue.

Now for the Lucite top, nail ¼ in. strips around the inside of the bulb box. Next cut the Lucite to the width of the opening.

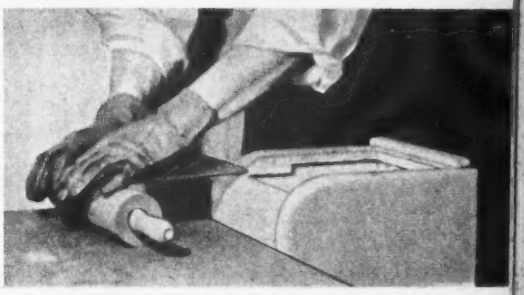
To form the curve, heat the plastic in the kitchen oven to about 300° F. Use gloves to protect your hands. Form the curve over a rolled edge such as the kitchen sink or a rolling pin. Check it in the pedestal and then cut to length.

You'll find a translucent finish will give a softer diffusion to the light as well as furnish concealment for the bulb and switch in the bulb box. This is accomplished by rubbing both sides of the Lucite with steel wool.

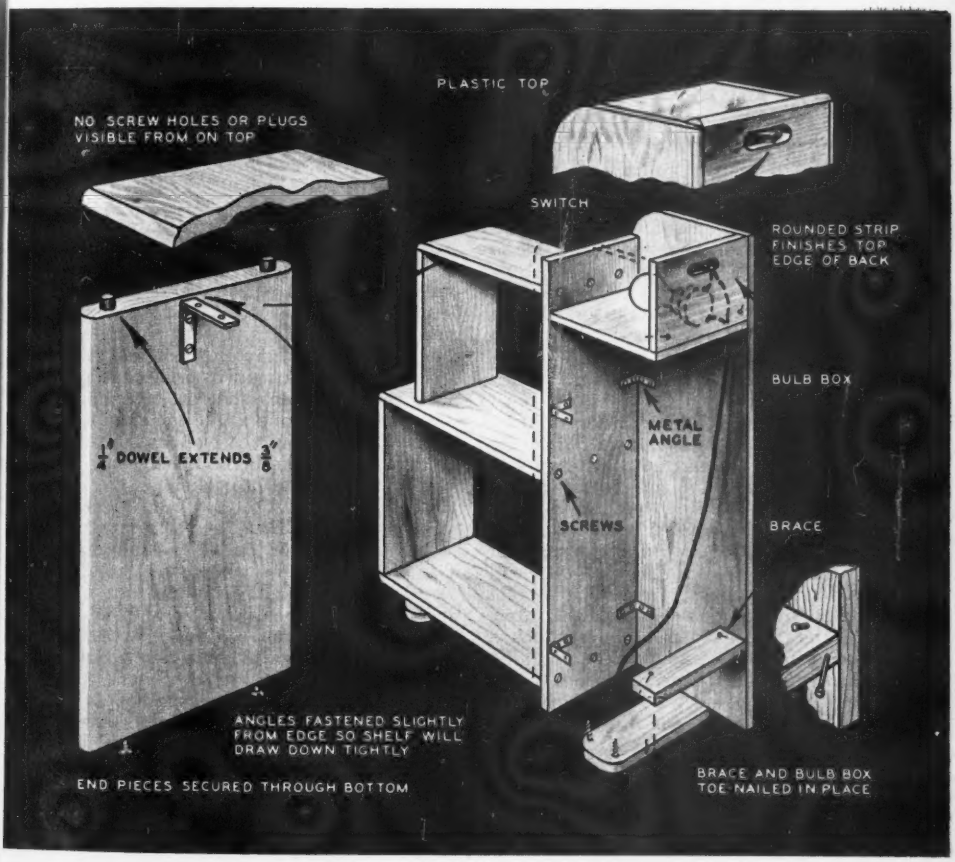
For a blond finish, after a thorough sanding, dust the shelf and follow with a good rub-down with medium-grade steel wool. Next, apply four coats of shellac thinned with equal parts of alcohol. Permit each coat to dry for about 30 minutes before rubbing it down with steel wool. Let the last coat harden overnight. After a final going-over the next day with steel wool, apply a coating of paste wax and rub it down well. •

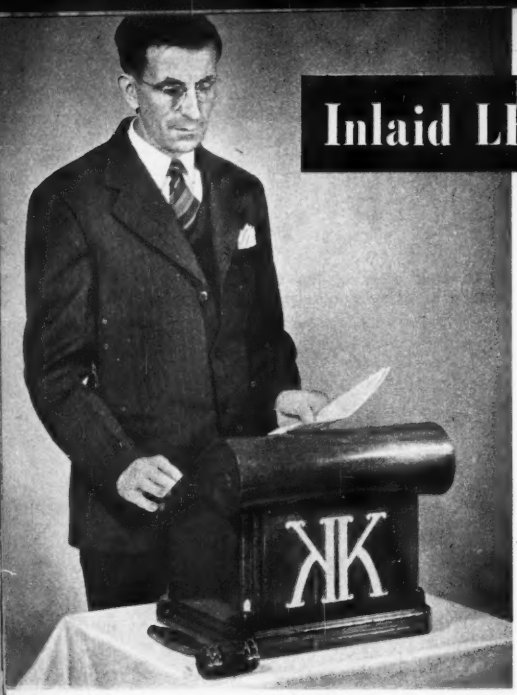


An interior view of the bookcase showing the method of using angle irons to fasten the sides.



The heated sheet of Lucite can be bent to the required curve by using a rolling pin as a form.





Inlaid LECTERN and GAVEL

"The meeting will come to order," is more authoritative when punctuated with a gavel blow on a lectern.

BY EDWIN M. LOVE

AND what better way to bring quiet to your club meeting than with this mahogany, holly-inlaid gavel and lectern to match.

The sides and front of the lectern are of ¼ in. plywood. The edges are glued into V-e grooves in the corner pilasters. Slightly undercut the edges to insure tight joints. When shaping the pilasters do not chamfer the corners full depth, but allow them to project slightly in front of the plywood. This excess is scraped and sanded flush after assembly.

If a monogram or other device is to be inlaid, proceed in this manner: Trace the design on veneer and glue it with rubber cement to a piece of heavy cardboard. Apply two coats of the cement to each, allow it to dry, and press the veneer on the cardboard. Thus reenforced, the design can be cut out safely with a jig saw or scroll saw. If you are using a jig saw, tilt the table slightly to undercut the edges of the inlay.

Separate the inlay from the cardboard with a knife and remove the remaining cement with a pencil eraser. Trace the outline on the front panel with a sharply pointed pencil and rout it to a depth slightly less than the thickness of the inlay. Then trim the edges of the mortise with a small, keen knife. Use a non-staining glue to hold the inlay in place.

Assembly of the pilasters and panels is best accomplished by using a column clamp for pressure. If you lack such a tool, the job can be done by tying ropes tightly around the lectern and then wedging wood blocks between the ropes and the work for additional pressure.

Note that the back is an open frame, having upper and lower rails made from plywood. The bottom of the lectern is made of plain plywood nailed from the outside, with supporting cleats beneath.

While the glue is drying, saw out the scrolls for the top. Tack two pieces together with brads driven in the waste wood and clinched. By placing the mahogany faces together for cutting, splintering of the veneers during sawing is prevented, and you will produce a pair of scrolls at one operation.

The top piece is rabbeted to carry the face veneer over the upper edges of the scrolls, and the veneer is cut extra long to project slightly in gluing. Sand the veneer flush after the glue dries. Make pine filler pieces to glue and screw to the sides to carry the scrolls. Smooth the under edges, since they can be seen by seated persons. Stain them to match the rest of the piece. Glue the scrolls, and while the clamps are in place, wedge out the eyes of the scrolls by inserting blocks behind them—an easy way to bring them into relief.

Build the front roll of three pieces of solid mahogany. Glue and screw a filler strip to the front of the lectern and glue to it a piece of ¾ in. mahogany, carefully paralleling the edges with the top. When this dries, fit the other pieces which, by reason of the chamfered edges, wedge up to form practically invisible joints. Rabbet the edges to fit over the scroll ends, a job that is not as difficult as might appear, for the ends are scribed, the shoulders sawed and chiseled, and the end wood split back and trimmed to the line. Note the upward

Use a sharply pointed pencil to trace the outline of the inlay. Avoid an intricate pattern.

Outline of the inlay should be routed to a depth slightly less than the thickness of the inlay.

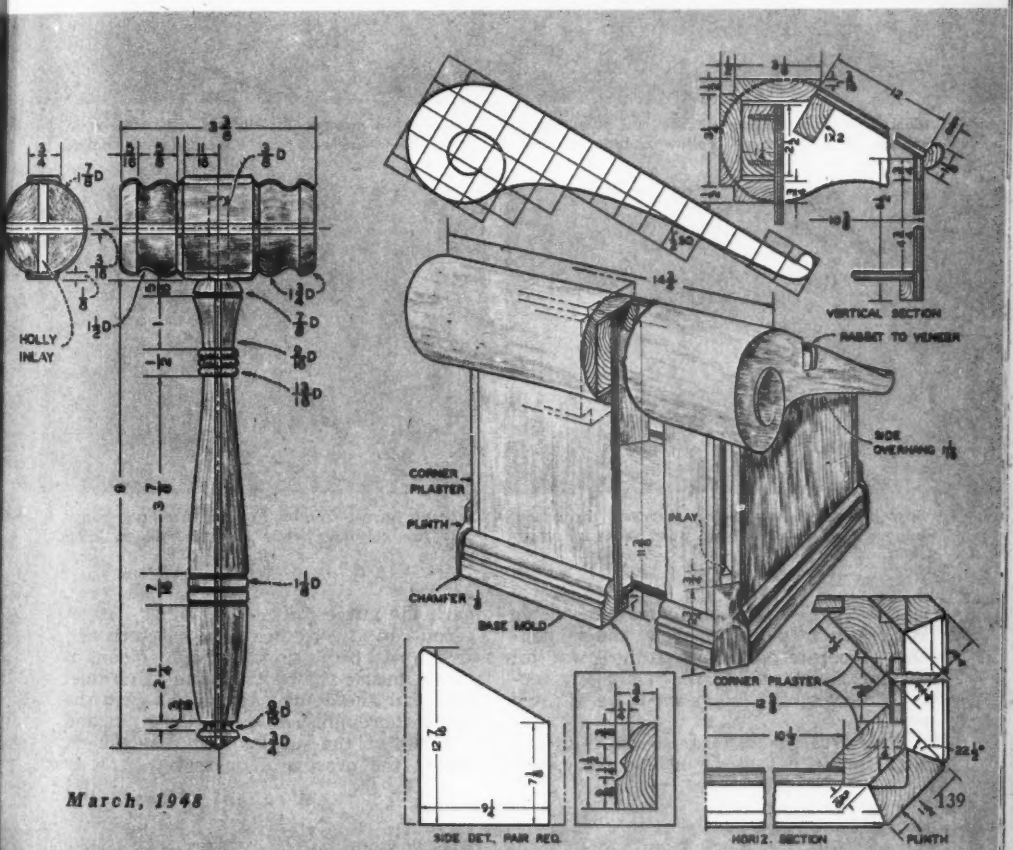
arch of the underside, which fairs into straightness as it approaches the top. The reverse scroll at the rear forms the book ledge.

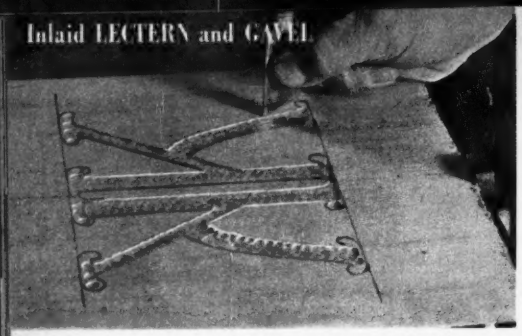
Shape the base moulding and cut the pieces to fit against the sides they join. The ends should make angles of 22½°. Then fit the plinth blocks and trim them to shape after the glue has thoroughly dried. Fill the triangular spaces behind the beveled holly blocks at the top.

To prevent stain from discoloring the inlays, coat them with white shellac using a small artist's brush. A little care in working the stain around the inlays will save much cleaning up preparatory to varnishing.

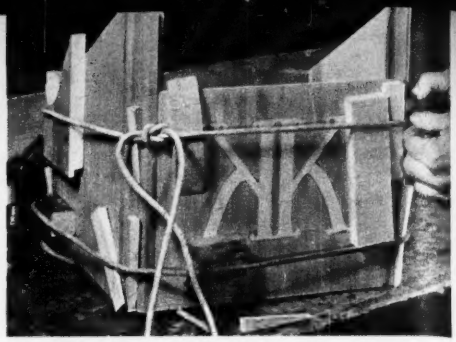
THE GAVEL

The gavel is a simple example of inlay turning. Prepare handle stock by gluing together two pieces of ½ in. mahogany with a veneer of holly between them. When dry, rip down the center, plane flat, and glue the new pieces together. The head



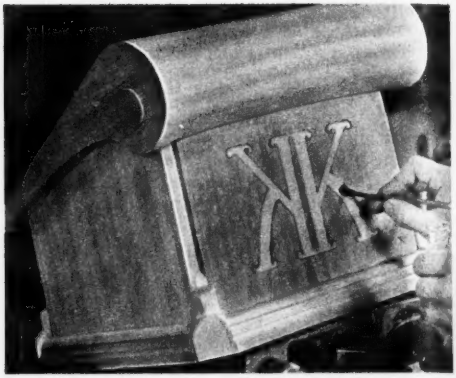


Trim the edges of the routed area carefully, with a sharp, pointed knife. Accuracy here is important.

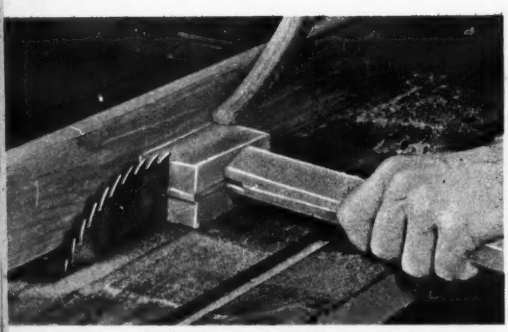


If you do not possess a column clamp for gluing, a wedged rope, as shown, will also do the job.

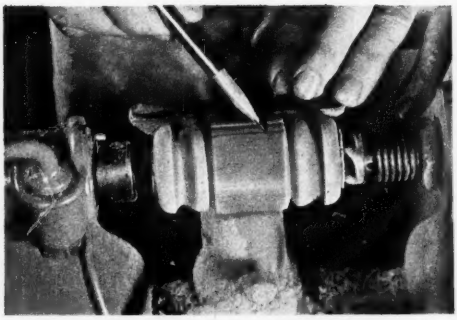
Easiest way of cutting out the end scrolls is by means of a jig saw. Follow outline carefully.



In order to protect the inlays from the stain, they should be carefully covered with shellac.



Saw the gavel head apart to insert the second inlay. Note the use of two push sticks for safety.



Scribing gavel head prior to inserting inlays. This can be done while head is still on lathe.

is glued up in the same manner, using thicker inlay pieces between the mahogany. Accurate centering of the work for turning is essential if the mahogany sections between the inlays are to be of equal size.

Then glue the ⅛ in. pieces to the gavel head, plane flat areas on the piece, and mark the guide lines by scribing.

You can give your finished lectern and gavel a real professional finish by means of a little muscle power applied to a fine steel wool pad and some paste wax. Rub the wax in thoroughly, following the grain, and then rub off the surplus with a soft cloth. Repeat the process if necessary. •

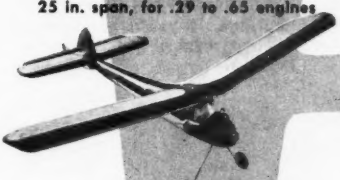
SHARKIE . . . . . Plan No. 377
22 in. span, Class VI, .60 engines

MR. MULLIGAN . . . Plan No. 374
39 in. span, for .29 to .65 engines

NIEUPORT SCOUT . . Plan No. 379
27 in. span, for .099 to .30 engines

P-47 THUNDERBOLT . Plan No. 375
20 in. span, for .099 to .29 engines

HUGHES RACER . . . Plan No. 381
25 in. span, for .29 to .65 engines



MI FLEETSTER*. . . Plan No. 376
Class A, for engines up to .19

MI ACROBAT . . . Plan No. 383
32 in. span, for .29 to .65 engines

*MI Fleetster is a free-flight model. All others are control-line.

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Car Care

Your Bumper Jack is a handy tool for inspecting and conditioning the car's rear springs, if they are of the leaf type. When the car is raised and the wheels hang down, the springs are opened up. You can then check for a broken leaf and apply lube more effectively. Springs with inserts or liners, however, should not be oiled.

Low Oil Pressure may be due to heavy deposits of carbon and cooling system scale. These deposits block normal transfer of heat from cylinders to the cooling water. The oil then takes over too much of the cooling job, breaks down and loses circulating pressure.

Trapped Sludge may be clogging the oil return hole of the timing gear case, forcing oil to leak out. That is one reason why it is better to drop the pan of an old car and clean out the sludge manually before using a chemical sludge remover.

Too Little Clearance at the tappets will lower compression by preventing the valves from seating tightly. This often happens after valve grinding because reseating automatically takes up clearance.

No Battery is any better than its weakest cell, so don't forget the importance of the cap in checking evaporation and spillage of battery solution. By trapping electrolyte spray the vent plugs also help keep the battery top dry.

Loose Motor Mounts can be detected by disconnecting one of the spark plug wires, taping its end and then running the engine. If the mounts are loose, or if there is a broken mounting, there should be considerable shake at idling speed. Some engines will make a snapping noise during such a test.

LOOSE OIL FILTER COVERS (left) may account for low oil mileage. If you remove cover for inspection, always replace with a new gasket.

AN ALNICO MAGNET placed on top of the filter cartridge will help withdraw fine metal particles from the oil system.

BEHIND THE WHEEL

With Fred Russell

If you want a personal reply from Mr. Russell, please include a self-addressed, stamped envelope.

•

What causes my 1939 Chevrolet to vibrate at speeds above 50 mph? When I step on the gas, the vibration disappears but when I cruise, it starts again. Another problem, I get 15 mpg on the road and 17 mpg in the city. Wendal Selbert, Limaville, O.

Check for loose engine mounts. Your unusual gasoline consumption also points to a mixture which is too rich at high speeds.

•

My 1940 Hudson heats up at 50 mph but as soon as I slow up, the heat indicator returns to normal. Have installed new hose, thermostat cleaned, block and radiator reverse flushed and have overhauled the car to the extent of $200. Leo Staebler, Belmar, N. J.

Late ignition timing will cause a steady temperature rise at high speeds. Also look for a cylinder head gasket leak and a collapsed lower hose connection.

•

Is the Stanley Steamer still made? Are there any books published on the subject? Robert P. Holst, Chicago, Ill.

Get a copy of "The Modern Steam Car" published by Clymer Motors, Los Angeles, Cal. Steam-powered cars are no longer made in the United States although many of them did participate in the 1947 Glidden tour.

•

Is there any way I can take out the front end sag of my 1941 Plymouth? George M. McKee, McGregor, Minn.

Jibo spacers made by the Arn-Wood Company, Denver, Colorado, may help you out.

•

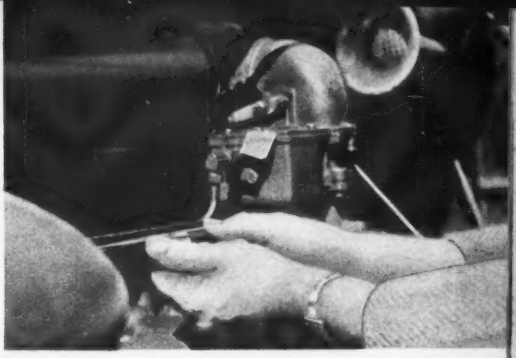
What causes the clutch in my 1940 Chevrolet to chatter after the car has warmed up? John V. Pawlowski, Chicago, Ill.

The driven plate hub may be too tight on the clutch shaft, thus binding when the engine has warmed up. Also, check for distortion of the clutch shaft splines.

•

My 1936 Ford groans every time I apply the brakes with the wheels at an angle. Brake drums have been reground, radius rods replaced and the front end of the car generally checked. Elmer Chapp, Auburn, Nebraska.

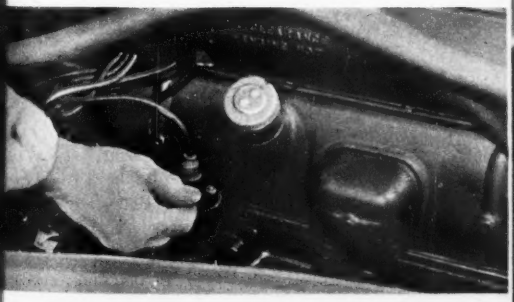
I think you'll find a loose brake backing plate in one of the front wheel assemblies the cause of your trouble.



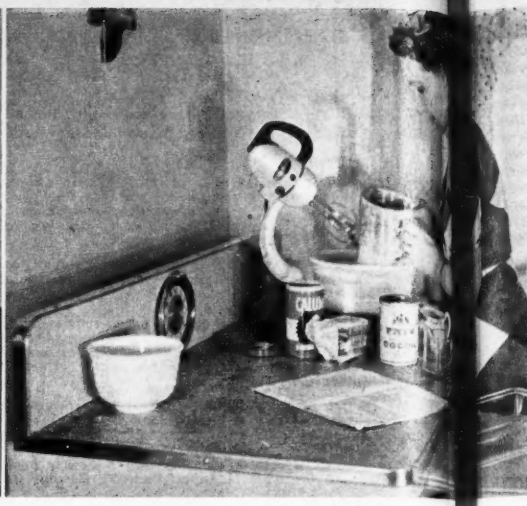
ODD NOISES under the hood may be due to excessive pressure in fuel and oil lines, especially if they touch each other. Try bending them apart.

SAVE THAT ANTI-FREEZE, considering last winter's difficulty in obtaining it. If possible, use new mixture as old tends to pick up harmful acids.

INEFFICIENT FOG LIGHTS are often due to high focusing. Light beams should be fairly low. Some fog lights have built-in level to aid in focusing.



STARTING TROUBLE can often be traced to moisture on top of the ignition coil. Lift up the rubber cap and wipe the wire.



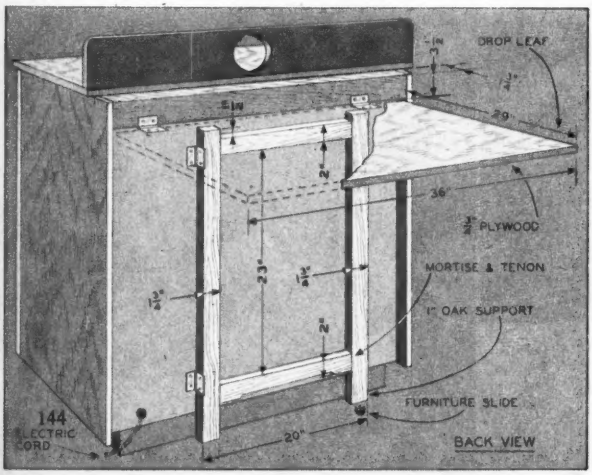
Combination Kitchen Cabinet and Table

Here's a practical utility cabinet, made of plywood, that features a built-in fold-away breakfast table.

BY E. S. STONEHOUSE

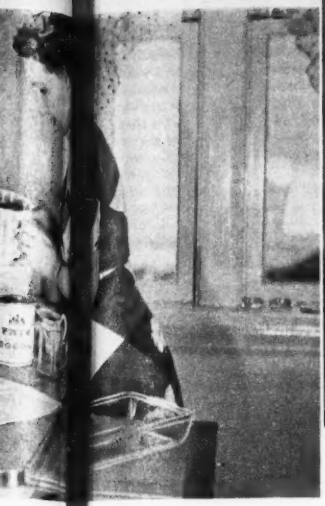
THIS modern project can be built without any intricate cabinet work. Set all joints in glue and countersink all fastenings. Make the base of 2x3 in. hardwood. Next, cut the cabinet bottom and shelf from plywood. Fasten the bottom to the base, setting it ¼ in. in from the back edge to allow for the dust panel. Put blocks in each corner of the base and add roller casters.

Cut two end pieces and glue shelf supports to them; then assemble the base, shelf, and end panels. Add the ¼-in. dust panel to the back and cut the front stiles and rails from ¾-in. stock and screw in place. Make four drawer guides, ¾x¾x22 in., and fasten them to the dust panel and the middle rail. Install three more guides at the top of the cabinet, as shown, to take the bread boards and the meat-grinder support.



The top is a piece of plywood with rounded front corners. Fastened to it is a clock panel, which has a hole bored in the center to take an electric clock and a double convenience outlet mounted near one end. Screw the top to the cabinet, 1¾ in. in from the back, glue a piece of linoleum to it, and finish the edges with chrome strips.

The drawers are made with ¼x1-in. mortise-and-tenon joints. Drawer bottoms are ¼-in. plywood. Make the bread boards and the meat-grinder support as shown. Two



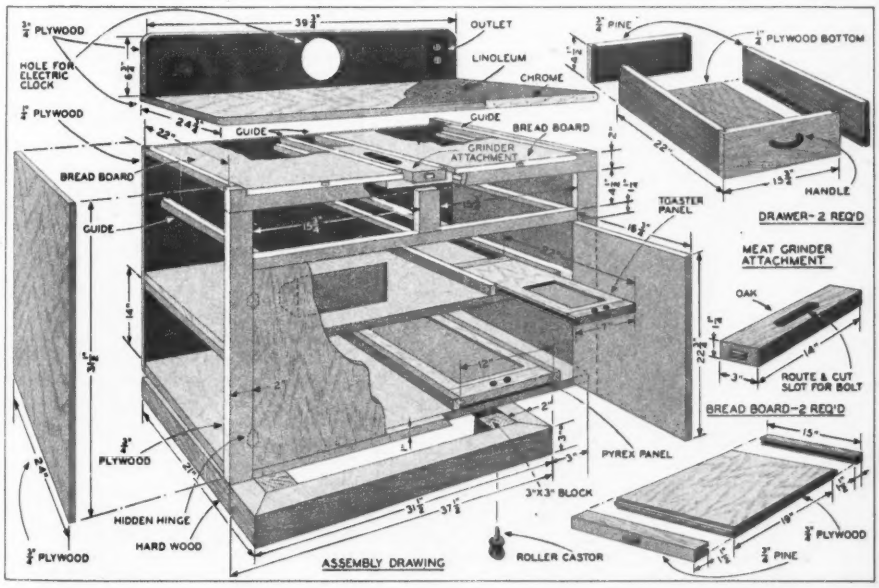
Make this handsome cabinet for some lucky woman and she'll never again have the opportunity to complain about lack of kitchen storage space.

sliding trays are installed. One is made of heat-resisting glass and plywood to take hot plates and the other is similar but has a smaller glass panel, just large enough for your toaster. Use plywood for the doors, attaching them with invisible hinges.

Mortise the table-support rails into the stiles. Cut the leaf out and screw a block to the underside to stop the support in a fully open position.

Fill all holes with plastic composition wood and sand down, slightly rounding off all corners. Finish with a coat of sealer and one of quick-drying enamel, choosing the latter to fit into the existing color scheme in your kitchen.

In use, this piece is normally placed against a wall, out of the way, where it serves as an ordinary kitchen cabinet. But when a quick morning snack is desired, by just swinging it around 90°, lo and behold, the hidden breakfast table is disclosed.



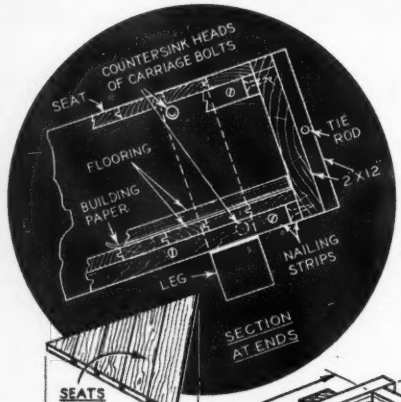
Child's Sand Box

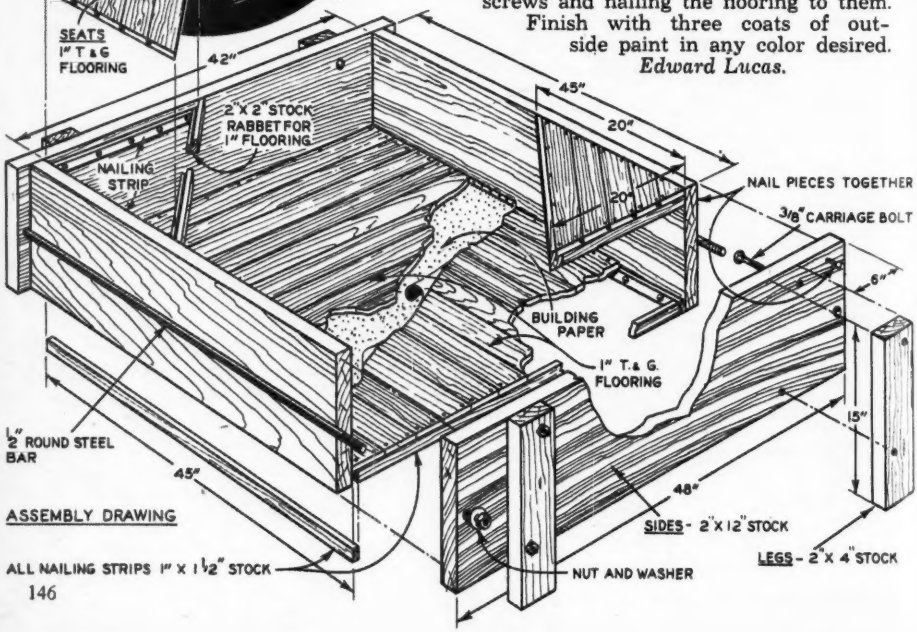
This durable backyard toy is made from stock lumber.

WITH this sand box and his imagination as the sole ingredients, your child will be able to concoct for himself many hours of healthful entertainment.

Make the side of four pieces of 2x12 in., cut to length as shown and joined by nails and two ½ in. dia. steel bars. These latter are threaded at both ends for nuts and washers. Screw 1x1½ in. nailing strips to the inside of the box and bolt 2x4x15 in. legs to the outside. The floor is made of two layers of 1 in. tongue-and-groove flooring, laid at right angles to each other, and a sheet of building paper. When nailing, leave a little room for expansion between the boards. Make the seats as shown, attaching the nailing strips with screws and nailing the flooring to them. Finish with three coats of outside paint in any color desired.

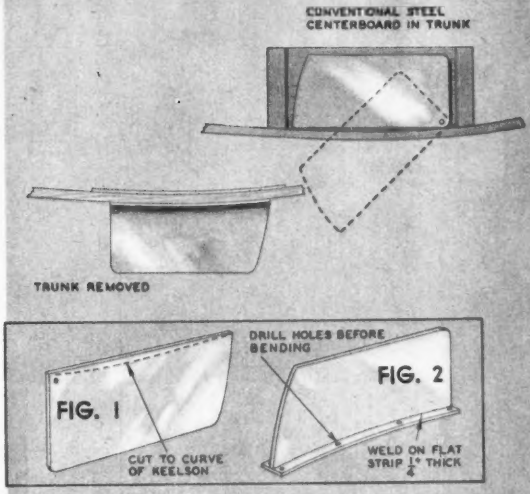
Edward Lucas.





ASSEMBLY DRAWING

Keel Conversion



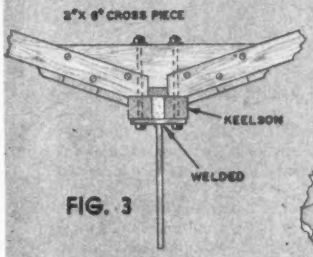


FIG. 3

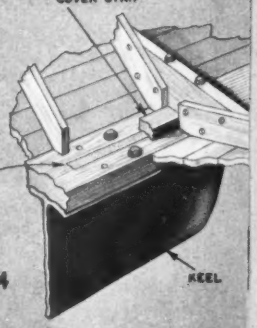


FIG. 4

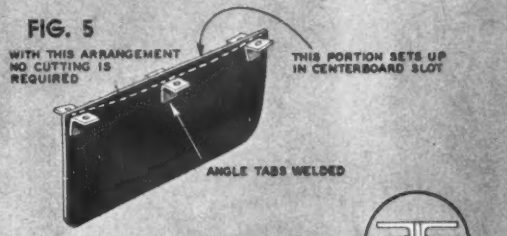


FIG. 5

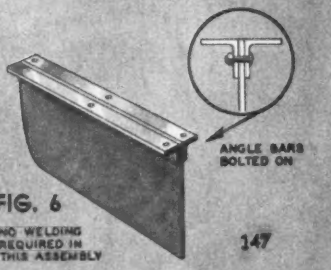


FIG. 6

NO WELDING REQUIRED IN THIS ASSEMBLY

IN WATERS where there are few shoals, more room can be had in your sailboat by making a keel of the centerboard, thereby doing away with the space-consuming centerboard trunk.

If you have metal-cutting and welding equipment, the easiest and neatest method of making the conversion involves cutting the top of the centerboard to the curve (Fig. 1) of the keelson; then welding on a piece of ¼ in. flat stock (Fig. 2) to act as a bolting strip. To install this keel, remove the centerboard trunk, fit a 2 x 6 in. floor timber at each frame and then bolt the keel, keelson and floors (Fig. 3) together. Fill in the centerboard slot with cement (Fig. 4) and finish off with short cover strips laid on top of the keelson between the floor timbers.

If you do not have cutting facilities, the same type of keel can still be installed on a curved bottom. Position three angle tabs on each side of the centerboard (Fig. 5) to conform to the curve of the keelson and weld them in place. The top of the keel will then project up into the centerboard slot. Pack cement in around it and finish off as before.

In case the keelson is straight in way of the centerboard trunk, no welding or cutting is required. Instead, simply bolt two lengths of angle bar (Fig. 6) to the centerboard and bolt the assembly in place, again finishing off as described above.—*Hi Sibley.*

Please put your name, address and complete picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Address: Monthly Photo Contest Editor, MECHANIX ILLUSTRATED, 67 W. 44th Street, N.Y.C.

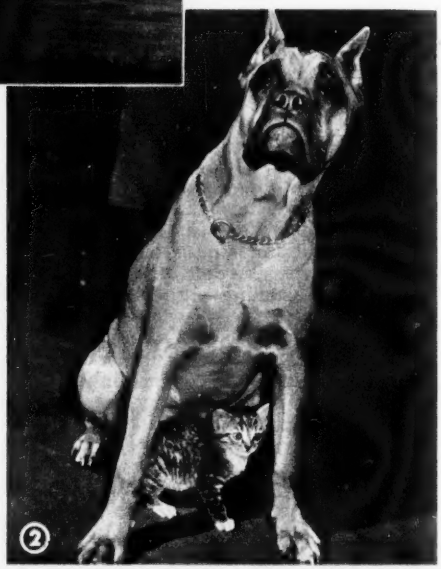
photo contest

① First prize ($10.00) .....Just Thinkin'
Late afternoon sun required an exposure of ½ sec. at f-11. Donald Grant, Windsor, Can.

② $5.00 Award ....."Mammy!"
Boris Dobro of Pasadena, Calif., used Defender film and a Press 40 flash; Linhof camera.

③ $5.00 Award ....."Just Like Daddy Does"
A lesson in photography conducted by Arthur L. Schoeni of Arlington, Va., Ikoflex camera.

④ $5.00 Award .....Beautifully Framed
The Picasso influence as portrayed by Robert Rolofson of Curnundu, Canal Zone; Graphic.



Rapid Darkroom Washer

AT A cost of 49c you can make a gadget that washes roll film and cut film as well as prints. It washes twice as rapidly as a tank and uses half the amount of water.

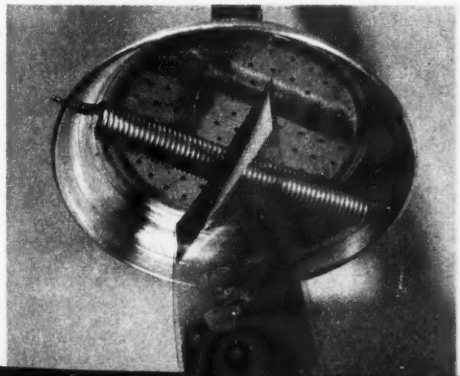
You can make the device in five minutes from a portable shower spray available in most drug and department stores. The type selling for 49c has a rust-proof aluminum head with an anti-splash rim and a long rubber hose complete with a faucet connector.

About the only work you will have to do will be to drill a series of holes through the edge of the anti-splash rim. As can be seen from the photos, the spring, inserted between two diametrically opposite holes, is the heart of this device.—*Ken Murray.*

First step is to drill a series of holes in the edge of the aluminum shower head. A Handee drill, or an ice pick can be used to make the required holes.

Next step is to fit a cadmium-plated expansion spring between two diametrically opposite holes. Wire at end of spring prevents play.

A single roll of film in position for washing. Spring can hold 5 rolls or 6 cut film negatives.



In use as a print washer. Use an elastic to hold head of washer in contact with tray bottom.

Flash illuminated the face, at same time providing a light background for black kitten.

Had sufficient light been poured on the black dress, it would have shown as much detail as model's black hair.

Photographing BLACK

THE proverbial black cat in a coal bin is indistinguishable from the coals only because light is absent. Given sufficient illumination, properly directed, a black cat as well as the black coals may be recorded in suitable tones, not only to give recognizable form to both, but also to separate one from the other.

In other words, the recording of black objects is entirely within the realm of photography, provided we pay attention to a few rules:

1. The angle of the lighting and the position of the camera with relation to a subject.
2. The intensity of the light source.
3. The nature of the black surface.
4. The number and distribution of the light sources used.
5. The "grayness" of the black.
6. Extent of detail required in the print.

First, and foremost, there is light. That little rule about the angle of incidence being equal to the angle of reflection also works with black objects. But, the light striking a black object is reflected to the camera in a narrower angle. Lighting, therefore, must be carefully directed so that the subject-light is adequately reflected back to the lens.

We know that black subjects reflect less light falling on them than other objects. However, if a black object reflects a given amount of light, *it will reflect more, if more light is directed upon it.*

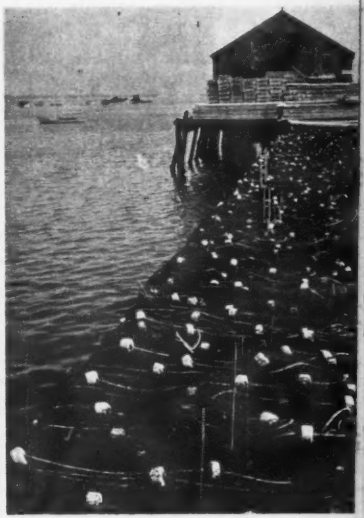
Black object surfaces vary. Black velvet is the extreme at one end with a high-gloss black metal surface, such as an automobile body, at the other. Between these two we have many variations of black.

Because black subjects tend to reflect light in narrow beams it is often necessary to use more than one light to complete the illumination rather than for the sake of light balance. This multiplicity of lights may be achieved without the usual

High gloss of a black auto body yields strong enough reflections to photograph white.

Two No. 2 lamps, one at each side, brought out sufficient detail in the black dog's coat.

Black fishing nets, worn through use, were easily photographed by light of noon sun.



Low, evening light was required to bring out the detail in this black, wrought iron fence, despite challenge of white house in the background.

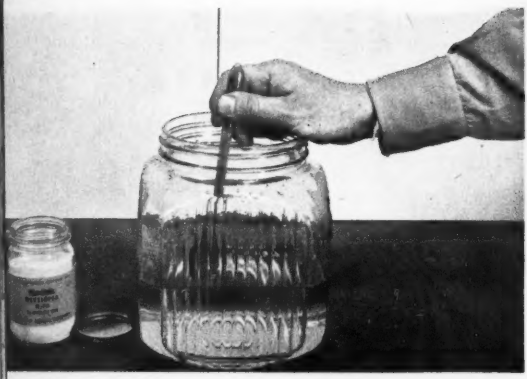
BY JACOB DESCHIN

Camera Editor, The New York Times

hazards of flat, distracting or uninteresting lighting because conflicting shadows usually will not show on black surfaces. With a lusterless black you will have even less trouble with reflections.

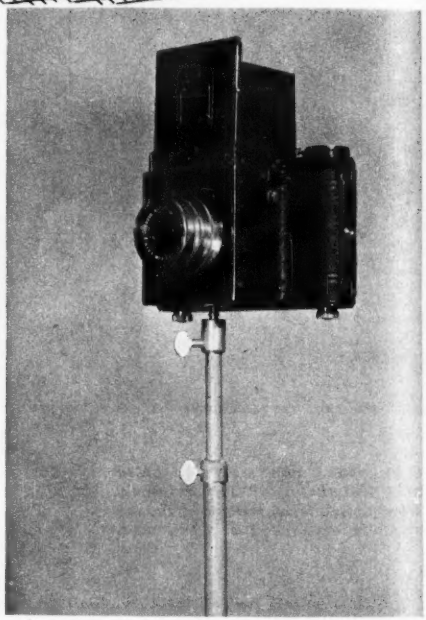
In the case of portraits, for example, a black dress should be made to look black; this can be done most effectively, of course, by keeping detail in the dress at the minimum. A black dress with a sheen to it will catch light in certain areas leaving the rest of the dress black, and this will be sufficient. As a matter of fact, the desirable portraiture objective that dress and other details should not compete with the main interest in the picture—the face of the subject—is well-served by a black dress. •

photo shorts

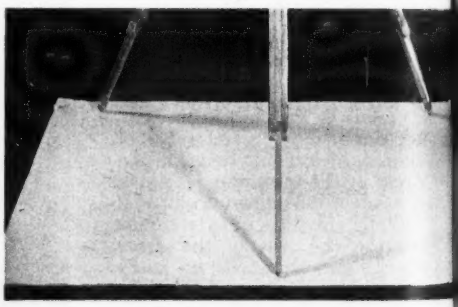


Mixing Kink. A wide-mouthed cookie jar makes an ideal mixing vessel for photograph chemicals purchased in powdered form. For a mixing paddle, use a plastic spoon, the kind made for iced tea.

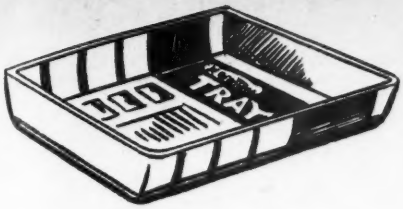
Darkroom Handy. If you keep a print of known quality at hand while printing and enlarging, you will always have a standard with which to judge pictures while they are in the developing tray.



Camera Stand. Fit center section of your photoflood stand with a ¼x20 bolt and you will have a handy camera support that will give you greater height than that obtainable with a regular tripod.



Non-Slip Tripod Base. If your tripod slips on marble or hardwood, try using a sheet of corrugated cardboard as a base. This prevents tripod from slipping and also protects floor from scratches.



Inexpensive Trays. The fiber trays supplied by some manufacturers of water-mixed paints, make ideal trays for use in the darkroom. They are obtainable at most paint stores for the asking.

QUESTION BOX

By Robert Brightman

If you want a personal reply, please include a self-addressed, stamped envelope.

•

Can ordinary house lamps be boosted to yield the equivalent light of photoflood lamps? To what Kelvin temperature should this booster raise the house lamps if they are to be used with Kodachrome cut film? F. A. Hohn, Collegeville, Ind.

You can boost the light output of ordinary house lamps to yield photoflood brilliance by means of a step-up transformer. However, it is rather impractical and your best bet would be to use No. 1 or No. 2 photofloods. About the only way you can determine just what color compensating filter you should use when using a step-up transformer would be by means of a Color Temperature Meter.

•

Can a single condenser be used in the M1 35mm Enlarger? Murray Locke, Providence, R. I.

Yes.

•

What lens attachment shall I get for my Brownie Reflex for copying? Albert J. Ernst, New York, N. Y.

Use a No. 13 Portrait attachment.

•

I have heard that negatives can be dried very quickly with alcohol. How is it done? R. C. LaHair, Norfolk, Va.

Yes, negatives can be dried very quickly by immersing them in alcohol. They also can be ruined very quickly as the technique is to ignite the alcohol-soaked negative. The flame should be blown out before the emulsion has had a chance to be affected; and that is the trick. We suggest you stick to the old-fashioned method of drying them in a warm, closed closet.

•

What is the liquid used to soften cellophane? Maurice H. Thurston, Beloit, Wisconsin.

Cellophane can be softened with a mixture of glycerin and water or with acetone.

•

What is the shutter speed of my Meteor camera? Michael Keizer, Brampton, Ont., Canada.

Your camera has a single shutter speed of 1/60th of a second.

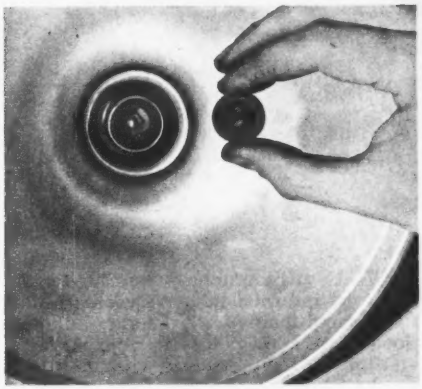
•

Would it be possible to coat flash bulbs for use with Ansco Color Film? Myron S. Wolf, Brookline, Mass.

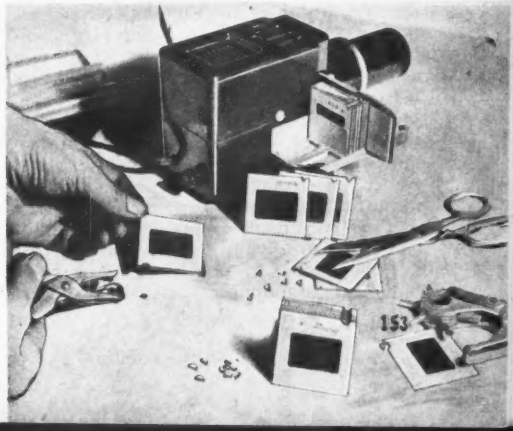
Yes, but it would be a good deal simpler to place the No. UV-16 Ansco Color Correcting Filter over your camera lens.

For Slide Enthusiasts. Illustrated at the right are three methods for properly lining up slides for projection. A pair of scissors, a leather punch or a paper punch can be used to make telltale cutouts.

New Birdie. When taking pictures of children and pets, a toy snapper, used at the right time, will attract attention in proper direction.



Self-Timer. A blinker or flasher button can be used as a self-timer when taking pictures by flash. Turn out room lights, open shutter and insert it in the socket *before* turning on the current.



A versatile lighting outfit: two No. 2 photofloods and an adjustable-voltage transformer.

"Dim those brights!"

BY ROBERT HERTZBERG

EVERY photographer who attempts to take informal indoor pictures of his friends and family with the aid of photoflood lamps knows that his subjects wince and then cover their eyes when he turns on the illumination. The light is blindingly brilliant, no denying it.

The usual types of "dimmer" controls don't help much, either. These are nothing more than double-pole, double-throw switches, connected so as to put a pair of lamps in series for "low" light and directly across the power line for maximum light. See Figure 1. Remember that photofloods are actually low-voltage lamps (about 64 volts) and give a lot of light when operated on 110 volts because they are overheated much beyond normal. This, of course, is also why they last only a few hours. When two lamps are put in series by a dimmer switch, the voltage across each is reduced to half the line voltage, or about 55 volts, so they run much cooler, give less light, and, incidentally, last much longer than before. This is all fine from the abstract technical standpoint, but the actual change from dim to bright is just too much for most people.

Camera users who recall some of their high-school electrical experiments invariably come up with the idea of controlling the lamps by means of a rheostat. Unfortunately, a rheostat capable of handling the popular combination of two No. 2 floods, for instance, would have to be very large and would get devilishly hot. The lamps themselves are a fire hazard to begin with, and there's no sense to adding another one. Anyway, rheostats suitable for the job aren't available as standard items.

The complete answer to the problem of light control is found, of all places, in the radio art. What does the trick, and most admirably, too, is an old and common device known as an adjustable "auto transformer." It is a standard product with most transformer manufacturers, and is sold under various coined trade names such as "Varitran," "Variac," "Powerstat," "Autoformer," etc. With the primary or input side connected to the regular 110-volt house circuit, the sec-

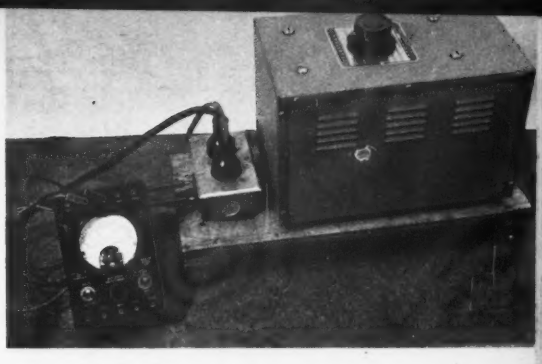
ondary or output side delivers from 0 to 130 volts in smooth, jumpless steps. Unlike a rheostat, which wastes a lot of current in the form of heat, the transformer is highly efficient and entirely safe to use. With a unit of this type at his disposal, a photographer can do things with lights he never thought possible.

Autotransformers are sold in many sizes for radio work. One particular model, the Type 4 "Varitran" made by the United Transformer Corporation, is ideally suited for photographic purposes in the home or small studio because it has a continuous capacity of 11 amperes. This is about the maximum current that can be drawn safely from house electric outlets without bringing the fire engines to the front door. Since a No. 2 photoflood takes about 4 amperes of current at its full rated voltage of 117 to 119 volts, this autotransformer can handle two lamps with complete ease and three without any sign of strain. Apparently it is generously under-rated for safety, because the writer has used *four* No. 2's at a time and the case was hardly warm to the touch. Actually, two photofloods are adequate for practically any ordinary indoor black-and-white still or movie work with film such as Super XX or the equivalent; three are adequate for close-ups in Kodachrome or Anscolor; and four make a room look like a movie studio.

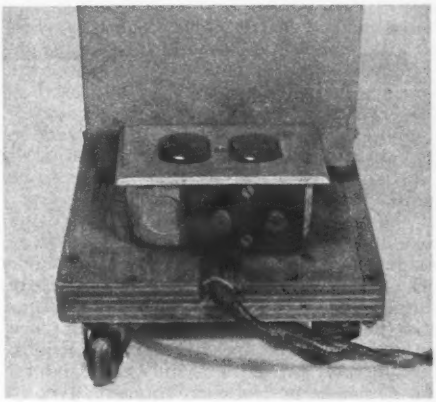
Since the Varitran is rather heavy, it is best mounted on a simple plywood dolly fitted with 1-inch plate casters, as shown in the accompanying illustrations. A duplex receptacle is fastened to one end of the board, to take the attachment plugs of the lamps. If more than two lamps are needed, cube taps are used in the receptacle. The wiring is simplicity itself, as shown in Figure 2.

The case of the duplex receptacle is fitted with a small Bakelite panel carrying two tip jacks. These permit the quick connection of a voltmeter for checking the output voltage. For color work this provision is very valuable, as the color quality of all incandescent lamps depends on the temperature of their filaments, and this of course is determined by the working voltage.

Both photographers and subjects accustomed to the violence of "dimmer" switch operation are in for a delightful surprise when they face a set of Varitran controlled lights. The routine is to put the subject in the shooting position, with only the regular room illumination on and with the Varitran knob turned all the way to the left. The floods are then completely out. [*Continued on page* 156]

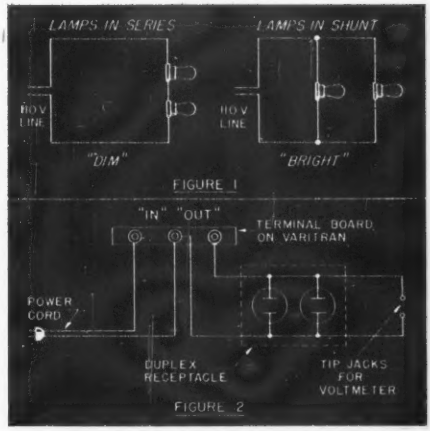


Above: A voltmeter of the type commonly used for radio testing is useful in color work. It plugs into convenient pin jacks on the outlet box.



Above: Close-up of the duplex outlet, showing the voltmeter pin jacks mounted on a small panel.

Below: Fig. 1 shows equivalent connections of ordinary "dimmer" switch; Fig. 2 shows the wiring of the Varitran auto-transformer unit.



"Dim Those Brights!"

[*Continued from page* 155]

As the knob is turned slowly, the voltage picks up. At about 25 or 30 volts the floods begin to glow a dim yellow, which is hardly noticeable above the room lights. If the knob is advanced at the rate of about two notches a second, the floods build up so gradually and smoothly that the subject's eyes have time to adjust themselves to the steadily increasing brilliance. They are still wide open when the lamps are on full, and the subject is comfortable and relaxed. The adults on whom I have tried this arrangement invariably comment, "How can you take pictures with so little light?" And that with two or three floods pouring out the near-equivalent of concentrated sunshine! Children are intrigued instead of frightened, and they consider the procedure something of a game.

After the pictures have been snapped, the lights are turned *down* as gradually as they were turned up, because sudden removal of bright light is almost as blinding as sudden application. The whole performance takes on a slightly theatrical air which seems to be conducive to good photography.

If the photofloods are run just below the house line voltage, their life is increased very considerably, and, very important for color work, their tendency to blacken is greatly reduced. The two lamps shown in the illustration have been used a clocked total of more than nine hours and are still clean and bright, although their rated life is only three hours.

As a matter of technical interest, a voltmeter and an ammeter were connected into the circuit to give some idea as the actual current consumption of two No. 2 photofloods at different settings of the Varitran control knob. At the same time, an exposure meter was aimed at a medium gray card illuminated by the lamps. Relative light readings were thus obtained at the same time. The results are as follows:

Lamp Voltage	Lamp Current Amps.	Weston Reading
50	5½	6
60	5¾	10
70	6⅜	18
80	6¾	25
90	7¼	37
100	7¾	50
110	8⅛	100
115	8⅜	110
119	8½	110 plus

Note that the light output hits maximum rather sharply at the rated operating voltage in the region of 110 volts. The power line itself measured 119 volts, so the lamp voltage was not raised beyond this value.

Several incidental uses for this Varitran unit developed after it was built. For movie making, it provides an extremely effective and simple means of making smooth fade-ins and fade-outs without the need for manipulating the diaphragm of the camera lens. The control knob is simply turned from "down" to "up" and then back again. Changing the lighting on a scene from low key to high key, or vice versa, is again only a matter of twisting the knob. •

MIcycle

[*Continued from page* 123]

varnished and then lubricated with petroleum jelly. At the top is glued the handle bar, in one piece, with a supporting disc to add strength as indicated in the plans.

The frame should be well filled with shellac or varnish; then enameled red. If you have not glued all of the parts together at this stage, be careful not to enamel the surfaces where glue is to be applied. It is easier to reach some of the surfaces before they are glued up than to enamel them afterwards.

There will likely be a slight variance in the length of V-belt required and for this reason it should not be purchased until final assembly. A wedge forced between the rear wheel and the frame will give the belt the required slight tension while the glued joints set and dry. Only a very little tension is required for the V-belt to function satisfactorily, and if it is too tight there will be an undesirable strain on the assembly. The final job consists in attaching the pedal bolts by screwing them into holes tapped in the ends of the pedal shafts.

A lighting generator with head and tail lamps can be added. The one we used is a Make-A-Lite, available at most automobile and bicycle supply stores. This outfit costs around $4 and is not strictly necessary from an adult point of view—but what a "lift" it gives to a child of 4 or 5 years! Bend the head and tail-light brackets to fit the MIcycle frame. As the latter is of nonconducting wood, it will be necessary to run a ground wire as well as a hot wire from the generator to each of the components.

Only one of the generator brackets is used to screw the unit to the rear fork. Include one of the locking washers that is furnished. The bracket is designed so the rotor can be pulled away from contact with the rear tire when lighting is not required. It will be found desirable to notch the bracket slightly so it will remain in its static position without difficulty. It is released by merely pressing the small lever. •

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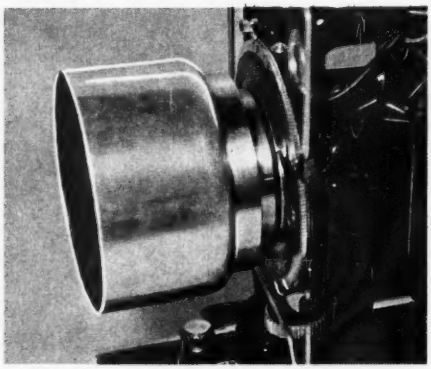
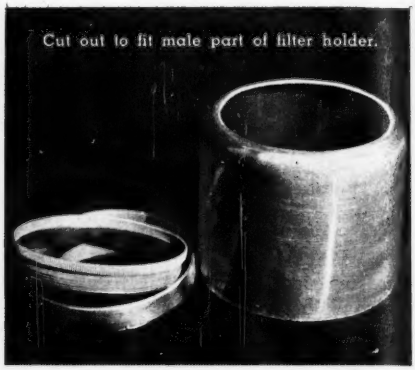
Combination Lens Shade

IF YOU want a neat, substantial metal lens shade that can also double as filter holder, go to a radio shop and ask for a discarded aluminum tube shield, a little larger in diameter than your filter adapter ring.

Cut a hole in the closed end of the tube shield just wide enough to accommodate the threaded end of the male filter adapter fitting, as shown in the photo. Insert the male fitting of the adapter and solder it to the tube shield on the inside. Finish by painting the inside of the shield flat back.

The lens shade, if too long, may have to be shortened to prevent blocking out corners of the negative.—*David W. Roberts*





Cut out to fit male part of filter holder.

Frank Hawks' Sky Chief

[*Continued from page* 129]

width and stuck to the celluloid. Striping and Texaco insignia can now be added using masking tape to insure even lines. License numbers are black decals.

A little cockpit detail adds the final touch to this scale model and the weight is negligible. Instruments can be drawn on heavy white paper with India ink. The seat back is made of bond paper with $\frac{1}{32}$ in. sheet balsa sides. Control stick is bent of $\frac{1}{16}$ in. diameter aluminum tubing while the throttle and spark lever can be easily bent from knob-head straight pins.

Now that you have completed your masterpiece, don't be afraid to fly it. As was previously mentioned, the plane was selected because of its generous wing area which will cause the model to fly at a safe speed. If all normal precautions are taken, the flights are truly magnificent. Because of the wheel pants, it is necessary to fly your Sky Chief from a concrete or other smooth surface.

The model possesses a rather low wing loading, making it advisable to fly on short lines even in a slight breeze. Generally speaking, in a dead calm you can safely fly on 35 foot .012 steel lines if your engine has a displacement of over .30 cubic inches. If you install a .49 McCoy, which naturally will result in a job heavier than if you use a .19 engine, you will be able to fly on longer lines because the centrifugal force will be greater. If your engine is less than .30 cubic inches, 25 foot lines are recommended.

Rather than toy with the simple control handles and individual line reels, we suggest you use a Jim Walker U-Reely control handle, available at any hobby shop. This is merely a combination handle and mechanism of molded plastic containing two steel control-lines, the length of which may be regulated while the model is in flight by reeling in or out. In other words, you can take off on 20 foot lines and increase the line length to as much as 100 feet while the model is flying! After you're through for the day, you wind in your lines! Before attempting the test flight, balance the model at the point previously mentioned. If the model does not balance at this point it will be necessary to add a small amount of lead to either the nose or the tail. Start your takeoff down wind with the engine running wide open. After getting accustomed to the "feel" and realistic flight, perhaps you too will be thoroughly convinced that scale control-line models have more appeal than the engine-on-a-string type. If not, you can't say we didn't try to influence you. •

plastic WATCH STAND

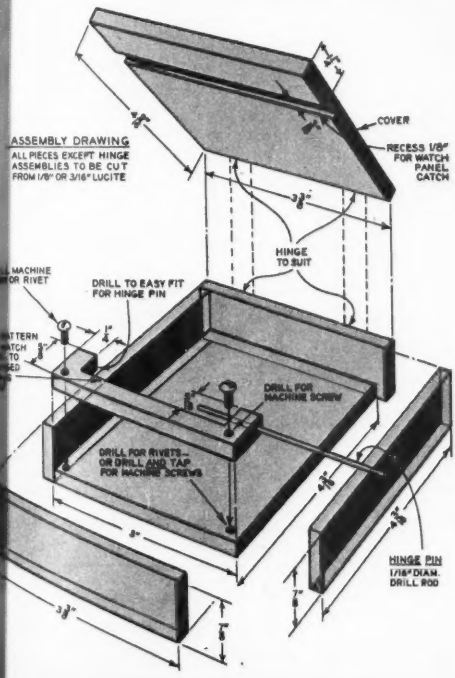
A handy receptacle for Grandpa's ticker that also doubles as a container for small jewelry.

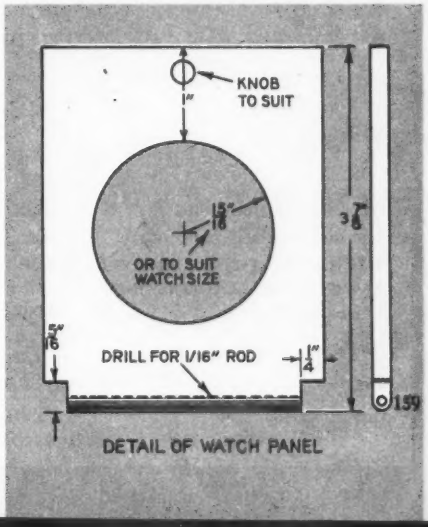
IF YOU are a clock-watcher, the nocturnal variety, or a traveler, you will appreciate this stand for your pocket timepiece.

Plexiglas or Lucite, $\frac{3}{16}$ in. thick, will do for the stock. Follow the drawing for outside dimensions. The circular opening for the watch, of course, depends upon the dimensions of your own timepiece.

Any commercially available acetone adhesive can be used to glue the bottom of the box to the side pieces. Dip the edges in the glue or else apply it with a brush. Hold the parts together by hand for a few seconds and then apply pressure. •

Above: The finished watch case. Below: Case minus cover showing it in use as a jewelry box. Opening for the face is cut with a circle cutter.





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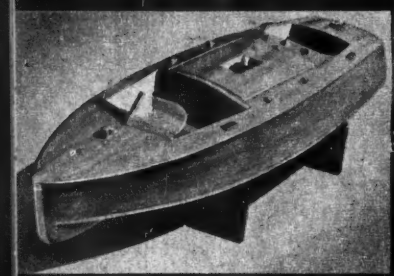

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ELECTRIC DREMEL POWER TOOLS

Moto-Tool

THE "POCKET-SIZE MACHINE SHOP"

A TESTED TOOL THAT PACKS YEARS OF PLEASURE

MOTO-TOOL No. 2
WITH EMERY POINT
$16.50

MOTO-TOOLS have the Right Speed for efficient operation. Approximately 27,000 R.P.M. CUTS CLEANER—SAVES CUTTERS.

If you get a kick out of making things, you'll want a Moto-Tool . . . it does work better, faster . . . on practically any material. High speed plus dynamically balanced armature provides vibrationless fingertip control. As a "War Veteran," Moto-Tool served in every branch of the Armed Forces. Compare Moto-Tool with other grinders and see for yourself why it's better.

MONEY-BACK GUARANTEE

Buy Dremel Moto-Tool from your dealer. If he cannot supply you, use coupon below to order on 10 day trial, money-back guarantee. Shipped postpaid for payment in full (send check or money order); or send only $2, we will ship C.O.D. You pay postman balance plus postage.

DREMEL MFG. CO., Dept. 148-C, Racine, Wis.

14 REASONS WHY MOTO-TOOL IS A BETTER BUY

- Patented automatic chuck lock pin.
- Instant-action, wrenchless chuck.
- Oil-less, sealed, trouble-proof bearings.
- Oversize armature shaft, hardened, ground and polished.
- 110-volt, universal type motor.
- Easily replaced commutator brushes.
- Dust-filtered air-cooling system.
- About 27,000 R.P.M. Cuts cleaner . . . saves cutters.
- Sturdy, shockproof bakelite housing.
- Housing has "pencil-type" finger grip.
- Sliding snap type switch.
- Handy hanger hook; cord protector.
- Weighs only 13 oz. . . . shaped to fit the hand.
- Dynamically balanced for vibrationless operation.

HERE'S BIG VALUE!

MODEL No. 1 MOTO-TOOL KIT

ONLY $17.50

This highly popular Kit contains Model No. 1 Moto-Tool and 34 practical accessories in attractive, lacquer-finish wood box. It's the biggest bargain in the field.

New... DREMEL DRILL PRESS

Only $9.95 Less Moto-Tool

Owners of Moto-Tools will find the new Dremel precision Drill Press indispensable for handling fine work such as creating costume jewelry, model making, wood carving, routing, etc. Sturdy tool clamp accommodates Model No. 2 Moto-Tool. Power unit can be raised or lowered, swung in any direction or quickly removed for regular off-hand use in a few seconds.

IF YOUR DEALER CANNOT SUPPLY YOU, USE THIS COUPON TO ORDER

DREMEL MANUFACTURING COMPANY • DEPT. 148-C • RACINE, WISCONSIN

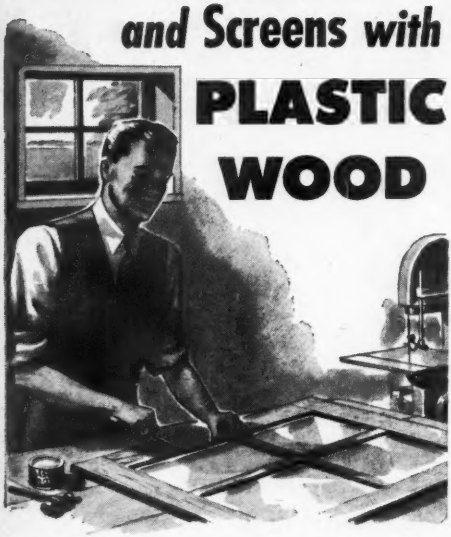
☐ Enclose find $_____(Check or money order in full). Ship items checked below at once Postpaid.

☐ Enclosed find $2.00 as part payment on items checked. I will pay postman balance plus postage upon C.O.D. delivery.

☐ Moto-Tool Kit No. 2 $23.50 ☐ Model 2 Moto-Tool $16.50 ☐ Moto-Tool Kit No. 1 $17.50 ☐ Model 1 Moto-Tool $9.85 ☐ Dremel Drill Press (Less Moto-Tool) $9.95 ☐ Free catalog of Dremel Tools and Equipment.

NAME_____ADDRESS_____CITY_____STATE_____

Repair Storm Windows and Screens with PLASTIC WOOD



When making new screens, or replacing old rusted screen, apply thin layer of PLASTIC WOOD around frame after tacking down screen. This gives greater strength to the frame. PLASTIC WOOD can be easily shaped to match broken molding. Valuable in replacing rotted wood in storm windows.

. . . dozens of other uses

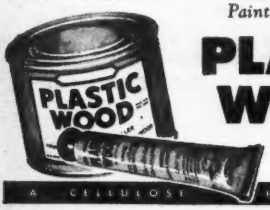
FOR FILLING . . .
- Cracks in floors
- Countersunk screws
- Chipped furniture
- Nail and screw holes

FOR REPAIRING . . .
- Loose tiles
- Loose casters
- Broken balusters
- Broken furniture

- PLASTIC WOOD SOLVENT is indispensable to the home workshop hobbyist for controlling the consistency of Plastic Wood and removing dried Plastic Wood from hands and tools.

T.M. Reg. U. S. Pat. Off.

At all Hardware, Paint and 10c Stores



PLASTIC WOOD

Tube or Can

A CELLULOSE FIBRE FILLER

Palomar Telescope

[*Continued from page* 103]

closer scrutiny of the astral outpost, illustrated in detail on pages 104-105.

Completely assembled, it is 194 feet in diameter and consists of a circular platform upon which is mounted two huge telescopes, a motor and generator, camera, radio and television equipment, living quarters and a vast assortment of scientific instruments to observe and record astronomical phenomena.

The platform spins in an easterly direction at a speed approximating the rotation of the earth, 1,080 miles per minute. This speed must be maintained in order to create, through centrifugal force, the equivalent of earth's gravity.

The motor which drives the satellite lies in the vertical axis and spins the entire structure through connecting spokes. Energy is obtained from steam which is created when the great circular mirror shown above the platform concentrates the sun's rays upon water in the pipes in the lower part of the structure.

The main telescope for observation of the skies stands on a turntable atop the platform while a smaller one, whose chief purpose is examination of the earth's surface, is attached to the lower platform. The 200-inch reflector of the larger "eye," supported by a high carriage, is permitted an extraordinary fore and aft sweep of some 240 degrees, limited only by the periphery of the mirror. This action is facilitated by a gear train in the trunnion assembly and the depth of the front and rear yokes. The instrument can be swung completely around, forward and backward. The turntable permits circular movement, while a forward yoke and a rear worm gear acting on rollers permit back and forth action.

The tower in back of the main 'scope contains the coelostat and a coronograph used in solar observations. From the mirror, the sun's image is reflected to the base and again reflected to the inconoscope of a television camera. The televised image is then carried directly to a projection room below, where it appears on a screen.

The smaller telescope would prove invaluable in relaying back to earth information observed on weather conditions of all sorts, and ship and plane movements. It is easy to see how important this would be in time of war. Location of enemy troops, planes and vessels could be spotted and speedily passed on to headquarters.

The instrument in the right central portion of the platform, resembling somewhat a military mortar, is a great camera inspired, in principle, by the present-day "super-Schmidt" camera designed by Harvard University's Dr. James G. Baker. It is remotely controlled from inside the plattorm and will be used in record-

[*Continued on page* 166]

Pack Every Spare Hour with FUN and THRILLS

Own a HARLEY-DAVIDSON

Swing into the saddle of a Harley-Davidson and set out for fun land! Pick up a pal along the way, or join a jolly caravan of riders happiness bound — to exciting race meets, hill-climbs, "gypsy tours", scenic wonderlands, faraway places. There's no sport like motorcycling — no fun like owning a Harley-Davidson. "Owning your own" is easier than you think. See your Harley-Davidson dealer today. Fill out and mail coupon now.

HARLEY-DAVIDSON
Motorcycles

HARLEY-DAVIDSON MOTOR CO., DEPT. MI, MILWAUKEE 1, WISCONSIN

Send FREE copy "ENTHUSIAST" Magazine filled with thrilling motorcycle action pictures and stories; also literature on your 1948 models.

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ATLAS PRESS COMPANY
352 N. Pitcher St., Kalamazoo 13D, Mich.

Please send me free illustrated bulletin on the new Atlas 10" Tilt/Arbor Floor Saw.

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Address_____

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CHECK THIS NEW ATLAS SAW — inside and out — see everything *you* would specify in a made-to-order machine! It's a natural for cabinet makers, builders, lumber yards, manufacturers, and home workshops . . . built with metal-working tool precision for easier, *more accurate* sawing . . . with ruggedness to stand the gaff of steady, heavy-duty work. Examine its big table: 27½" x 27½", with 13¼" working surface ahead of the blade. Note the precision ball bearings for *permanent smoothness.* Go over the new-type rip fence — *self-squaring,* locks rigidly at *both* ends, *releases instantly* for positioning or removal — nothing else like it! This new Atlas is the last word in saw engineering — built for years of dependable service. Ask your Atlas distributor, or send for illustrated bulletin.

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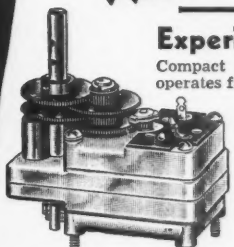
Lafayette Radio Corp.

A Few of the Thousands of Great Money-Saving Buys in this 160-Page Radio Catalog!



Experimenters Motor

Compact induction type AC motor operates from 25 to 30 volts AC, 60 cyc. Motor speed 2400 r.p.m. with gear train driving ¼" shaft at 24 r.p.m. Thermal cutout prevents overload damage to motor. Measures 2 x 1¾ x 3", excluding shaft which is ¼" dia. extending 2⅞". **$2.50**

C14699 .....

5-Tube AC-DC Kit

Five-tube AC-DC superheterodyne. Includes automatic volume control, true tone reproduction. Streamlined airplane dial, wide tuning that covers 550 to 1600 KC, built in loop antenna and Alnico V speaker. Cabinet is beautiful brown plastic. Kit contains all parts to build complete receiver.

C24456—With cabinet and tubes **$13.75**

Wireless Microphone

Talk through your radio with no connecting wires. Tuning by means of knob at side assures a clear channel. Covers 1000 to 1700 KC. Entirely self contained with power supplied by one flashlight cell and a Minimax "B" battery. Extremely small drain due to use of single 1L4 tube. 6¾" high, 5¼" deep, 5" base. With batteries and tube.

C22548 ..... **$6.63**

Crystal Pickup

Quality crystal pickup mounted in arm for 10" and 12" records. Mounting included. Requires ½" hole. Shielded lead and cartridge case. Aluminum die cast arm finished in smooth dark brown. With semi-permanent needle.

X143 ..... **$1.59**

Even-Speed Phono-Motor

Model 80. Rim-drive phonomotor. 9" turntable. Constant speed (78 r.p.m.) self-starting, forced draft air-cooled. For 10" and 12" records. 110V. 60 cycles only. Wt. 4 lbs.

X182 ..... **$2.69**

Concord Radio Corporation, Dept. NA-38
901 W. Jackson Blvd., Chicago 7, Ill.

Yes, rush FREE COPY of the comprehensive new Concord Radio Catalog.

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Free! Vest Pocket Welders' Guide Full of welding tables, charts and data.

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I'm interested in the profit-making possibilities of Hobart Arc Welders. Send me free book, and details on items checked.
☐ Electric Drive ☐ A.C. Welder
☐ "Build Your Own" ☐ Welding School

NAME

ADDRESS

Palomar Telescope

[*Continued from page* 162]

ing rocket and meteor flights and other astral phenomena which flash by so speedily that the human eye cannot observe them.

Inside the platform, located on various levels along the rim, are the living and working quarters for members of the satellite's crew. These quarters are compartmented so that a measure of safety can be provided if some part of the platform is sheared away by flying meteors.

They look like weird men from other planets, these crew members of the observatory in the sky. Encased in bulky, electrically heated "breathing suits," they tread cautiously in their well-nigh weightless world. Security lines connect them at all times with the central airlock in the bowels of the satellite, which supplies life-giving oxygen to all on board. When they emerge from the interior and prowl atop the platform, they proceed by means of hooks.

This, then, is the answer of science to the limitations of the Palomar telescope. Weird, startling, unbelievable? No, answers science. Not half so unbelievable as the myriad of wonders which the age of the atom will eventually bring. •

Pills Increase Intelligence

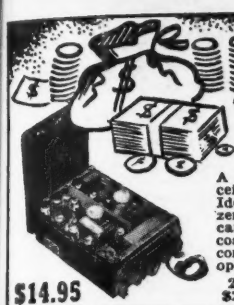
[*Continued from page* 53]

talking as if the brain were the same thing as the mind, or intelligence. Maybe it is. However, nobody has been able to put a finger on an intelligence center in the body and say, "This is it." If you wear a small hat size, don't be downcast, nor proud if you wear a large one. The size of your brain, within ordinary limits, is no index of genius. Two brains of relatively huge size will illustrate this. One belonged to Napoleon, the other to an idiot.

One secret of intelligence, latest neurological research, indicates, lies not in the brain itself but in the covers (meninges) that enclose it inside the skull. Here are found the vessels that supply blood to the brain. Significantly, these blood vessels are oversize and numerous in the brain-covering membranes of men of genius.

Not only the volume of blood but its composition, the ingredients it contains, affects intelligence. A satisfactory method of altering blood composition so that exactly the right elements are carried to the brain is lacking. Glutamic acid experiments may be the first step toward this goal. The problem of making everybody smarter might be stated in deceptively simple terms. All you have to do is to see that the proper fuels get into the blood, that a very generous supply of this blood constantly courses through the brain, and the world is your oyster. •

MONEY SAVING SURPLUS BARGAINS



GENERAL ELECTRIC
BC645

TRANSCEIVER

A brand new Transmitter-Receiver covering 450-500 MC. Ideal for use in proposed citizens band between house, and car, boat, etc. 15 tubes alone cost $58.00. Complete with conversion date for 110 VAC operation in sealed GE carton.

$14.95 2 for $27.00 Add postage for 25 lbs....

GN58 GENERATOR

Makes excellent home lighting plant, operated by wind propeller, waterfall, gas engine, or hand crank. Reduction gear allows full output at slow speed; supplies 6 volts at 2.45 amp., 425 volts at .115 amp. New. Add postage for 28 lbs. **$7.95**

DYNAMOTORS

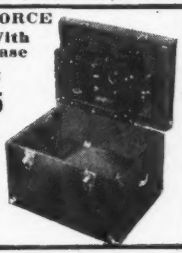
Dynamotor A—Input 12 volts, output 1000 volts at 350 MA. Shipping weight, 72 lbs..... **$7.95**

Dynamotor B—Input 6 or 12 volts, output 500 volts at 160 MA. Shipping weight, 30 lbs..... **$5.95**

Dynamotor C—Input 28 volts, output 220 volts at 60 MA. Add postage for 6 lbs..... **$1.50**

BRAND NEW ARMY AIR FORCE

ASTROGRAPHS With Case

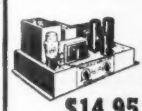


New B29 navigation instrument which can easily be used to make a good contact printer, strip map holder, etc. The plywood case 14½"x11"x10" high is perfect as a tool kit, camera, projector case or for building a portable phonograph picnic kit, make up case, etc., has leather handle reinforced covers, 8 covered compartments in bottom. Cost Gov't $125.00. Add postage for 20 lbs.

Only **$3.95**

HEATHKIT

AMPLIFIER KIT



Complete kit to build excellent 25 watt amplifier, ideal for P.A. system, phonograph amplifier, etc. Push pull circuit using best parts. Supplied with 4 tubes, punched chassis, blueprints and instructions. Add postage for 25 lbs.

$14.95

G.E. BC375

TUNING UNIT

A beautifully constructed tuner containing the best in variable condensers, coils, vennier dials, etc., at least $30.00 worth of parts, complete with conversion instructions to transmitter and receiver. Add postage for 20 lbs.

$2.49

HEATHKIT

TRANSMITTER KIT

Complete kit for building a fine amateur transmitter includes every part—tubes, cabinet, 80 meter coil, crystal, blueprints and instructions, less power supply. Add postage for 30 lbs.

$19.50

HEATHKIT VACUUM TUBE

VOLTMETER KIT

Build yourself this beautiful Electronic AC and DC voltmeter and ohmmeter ranges 3 volts to 1000 volts and to 1000 megohms. Every part supplied including blueprints. Add postage for 8 lbs. **$24.50**

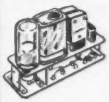
MINIATURE HEADPHONES

$1.00 Hearing aid type, comfortable, keeps out outside noise, one of the army's best types.. Add postage for 2 lbs.

THROAT MICROPHONE

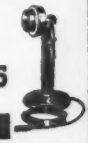
Used by army in noisy applications in aircraft, tanks, etc. Many interesting home uses. Add postage for 1 lb..... **$1.00**

WALKIE-TALKIE UNIT



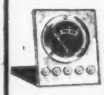
$1.00 BC746 Tuning Unit contains two crystals, receiving coil and condenser and transmitter tank coil, fine for radio builders. Add postage for 1 lb.

T32 TABLE MICROPHONE



One of the army's finest built by Kellogg. Ideal for public address, transmitters, etc. Add postage for 5 lbs..... **$2.95**

POCKET TESTER KIT



$2.95 Build this AC and DC voltmeter and save 2/3 the cost. Includes 2½" meter, resistors, rectifier, and mounting. Reads 0 - 3 - 30 - 300 VDC and 0 - 300 VAC, instructions. Add postage for 2 lbs.

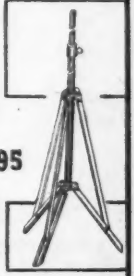
RADIO BUILDERS' KITS

Power supply kit to convert army radios to 110 VAC	$5.95
5" P.M. loudspeaker for army radios	$2.80
Experimenter's Kit, 5 lb. of radio parts for	$1.00
Kit of 20 radio tube sockets for	$1.00
Kit of 20 Bypass bathtub condensers	$1.00
Kit of 10 radio volume controls	$1.95
Kit of 10 Midget variable condensers	$1.95
Kit of 100 color coded insulated resistors	$1.95

G.E. CIRCUIT BREAKER

$2.95 Protect your electrical equipment, eliminate fuses. 50 AMP 220 Volt rating. Add postage for 4 lbs.

ARMY TRIPODS



Excellent for floodlights, screens, etc. Raises to 12 ft., folds to 5 ft. Rugged construction. Express shipment only **$4.95**

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$2.95 24V.D.C. size 1¼"x 1"x2". Add postage for 1 lb.

Power supply kit to convert motor to 110 V.A.C. Add postage for 6 lbs. **$2.49**

NO ORDERS under $2.00

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DEPT. I . . BENTON HARBOR, MICH.

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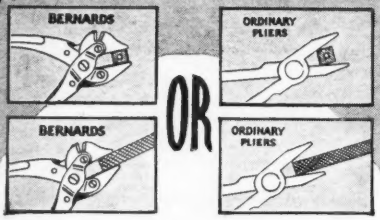

BERNARD Pliers hold best because jaws are parallel, close like a vise, hold tight, won't slip.

Cutters, with one-ton bite, are on outside of head, easy, convenient to use.

A Word to FISHERMEN—BERNARD Parallel Action Pliers are perfect for the angler. Those parallel jaws have tremendous gripping power—and the cutters are perfect for snipping a hook or wire leader.

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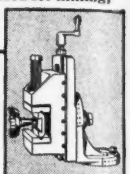
9"	1-1/2"	$35	14-1/2"	4"	$65
10"	1-3/4"	$45	16"	4"	$75
13"	2-7/8"	$55	16/24"	4"	$75

Write for dimension sheet



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MOHAWK CHIEF

REAL AIRCRAFT CYLINDER

Not Cast Iron or Aluminum Without Liner! 1-piece steel cylinder * Deep cylinder fins * 1-piece crankshaft * Alum. crankcase * 1-piece steel piston * Bakelite tank * Adjustable timer * Precision needle valve * Alum. conn. rod. * Champion spark plug * SPITFIRE COIL — $1.95

TRUE QUALITY $8.95

SPECIFICATIONS

.299 disp. B class. 2-10000 RPM. Wt., 7 oz. .760 bore. .660 stroke. If not available at dealer order direct, adding 25c for handling. Or send $1.00 and we will ship C.O.D. for balance. Mohawk Eng. Co., Mohawk, N.Y.

EVERY ENGINE **BLOCK TESTED GUARANTEED**

THIS MOTOR $2.45

1/30 HP 24 volt DC motor 2450 R.P.M. .05 amps. 1/4" shaft size overall 3" x 4". Weight 3 lbs. Also operates on 32 volts . . . only

USE AS 6 VOLT GENERATOR

Generate your own power. Can be operated on your bicycle wheel. Furnishes sufficient power for two 6 volt bulbs. Resistor furnished free with each motor enables you to maintain constant voltage. Special Price $2.45, or 4 for $7.50. Write for price in larger quantities.

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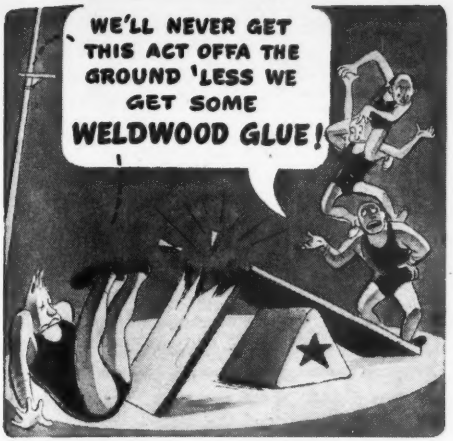
Riveter and Chipping Hammer

Model AVC-11, like new. Takes up to 5/32" rivet. $66.00 list. Special price $6.95. Wt. 5 lbs.

Prices are F.O.B. Chicago. Immediate delivery. Send check or money order today. Sold on money back guarantee.

C & M EQUIPMENT CO. 1831 S. State St., Dept. C-3 Chicago 16, Ill.



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Blade snaps on—Stays put
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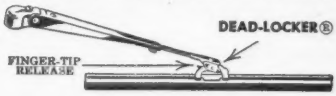

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2	.855	13/16	20	.8595	3-5/16	1.095	15
5	1.250	3/4	20	1.2495	3-9/32	1.452	10
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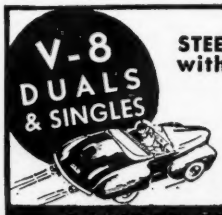

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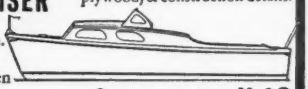

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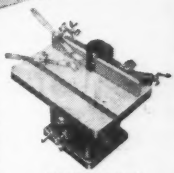

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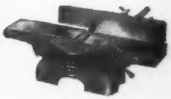

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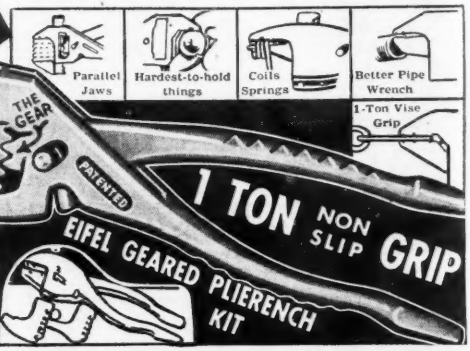

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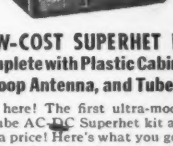

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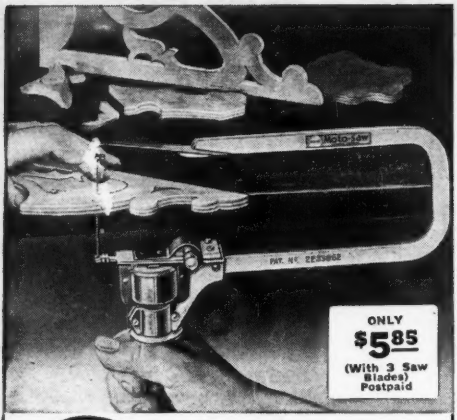

ELECTRIC DREMEL POWER TOOLS

MOTO-SAW

THE AMAZING ELECTRIC SCROLL SAW

Boys from 8 to 80 (and girls, too) have fun with a Moto-Saw . . . it works more like magic than any tool you ever saw! It takes no effort to run, no perceptible pressure to feed. Runs 7,200 strokes a minute . . . easily cuts intricate scroll designs in medium hard wood up to ¾" thick. Blade holder faces blade 4 ways . . . permits you to saw sideways as well as forward and backward. No limit to length of stock it will cut . . . saws to center of 19" widths. **Moto-Saw is as safe as a hand saw** . . . has only two moving parts . . . never needs oiling. Uses 110-120 V. 50 or 60 cycle A.C. (only). Thousands of satisfied users.

MONEY-BACK GUARANTEE: If your dealer does not yet have Moto-Saw, send only $5.85 . . we'll pay postage. Or send $1, and pay postman balance plus postage. Money back if not delighted after 5 days' trial.

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WORLD'S LOWEST PRICED

ADDING MACHINE

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Fits vest pocket or purse. Guaranteed accurate. Operated as easily, and as reliable, as machines costing many times as much. Not a toy. **Precision made, very durable—guaranteed for life against defects in construction.** You positively can't buy a calculator of equal quality for as little money. **ACCEPTED AS THE FINEST LOW PRICED CALCULATOR FOR OVER 35 YEARS!** Operates with a flick of your finger. Adds, subtracts, multiplies, divides—counts up to one billion. Pays for itself over and over in mistakes avoided, and time saved. **MAKES IDEAL GIFT.** Sold on a positive money back guarantee. Send only $2.95, Calculator sent postpaid, or send name and address and pay postman $2.95 plus postage. **MONEY BACK IN 10 DAYS IF NOT DELIGHTED!** (If outside U. S., send $3.50.) **AGENTS WANTED.**

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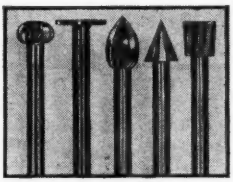

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Will fit all electric grinders. The ideal tools for cutting wood, metal or plastic in the home or shop. Assorted shapes and sizes on ⅛" or 3/32" shank.

Regular Value —$27.00 Now only $9.90

Postpaid in U.S.A.
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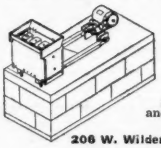
BUILD THIS BLOCK MACHINE



Sell blocks; or build your home, garage, barn at ⅓ cost by making and laying your own blocks.

This simple machine which you can build yourself at a cost of about $15 (excluding motor) will make a block in 30 seconds using only one form. 2 to 4 forms can be used on each vibrator.

Power driven concrete mixer plans also. Send dime for details and "How to Make and Lay Blocks."

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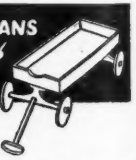

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. . . 4" wheel and tire 5/16" steel sleeve, nickel plated hub cap . .	$ .45 ea.
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. . . 8 x 2" wheel, semi pneumatic tire, 7/16" Ball Bearing	2.50 ea.
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. . . 10 x 2.50 wheel, semi pneumatic tire, ½" Ball Bearing	4.50 ea.
. . . 12 x 1.75 semi pneumatic tire, 7/16" Ball Bearing	3.50 ea.
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To order above wheels write number wheels wanted in space provided, tear out and mail this ad with check or money order and your name and address.
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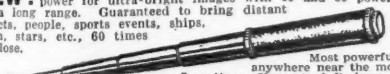

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Blueprint 27x36" now printed on both sides showing squares full size. Shows how to find the length of any rafter, find any angle in degrees, frame any polygon three to sixteen sides, read the board foot and brace tables, octagon scale, rafter tables; many other uses. Can be scaled down for model work as well as full scale framing. Also chart changing pitches to degrees. For use with radial saws. About 13 square feet of printed copy sent postpaid for $1.00. No checks or stamps. **MASON ENGINEERING SERVICE, 2033 N. Burdick St., Dept. 3, Kalamazoo 81, Mich.**

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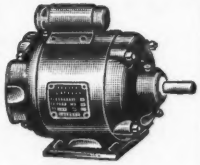
Heavy Duty

Nationally known makes. Guaranteed capacitor type, ball bearing heavy duty motors, 110/220 volts.



60 Cycle AC Single Phase
1725 RPM.

¼ HP	Wt. 30 lbs.	$24.00
½ HP	Wt. 36 lbs.	$34.50
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1 HP	Wt. 80 lbs.	$57.00

These motors also furnished in 3450 R.P.M. at above prices. Prices are F.O.B. Chicago. Immediate delivery. Send check or money order today. **SOLD ON MONEY BACK GUARANTEE.**

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FUN and PROFIT using AMAZING NEW MAGNETIC SAW

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No Motor Needed . . . Just Plug In! Portable! Safe! Cuts Clean, Smooth . . . Needs No Sanding!

This new, remarkable, patented magnetic jig saw needs no belts, no motor, no gears, no oiling! Just plug into any 50 or 60 cycle A.C. 110-130 volt outlet—and saw! Portable. Use anywhere . . . kitchen, basement, attic. Ideal for apartments! Cuts clean, smooth . . . no sanding necessary. Perfect for models, displays, inlays, silhouettes, etc. **Special magnetic Safety Stroke feature** permits whole family—even small children—to use. Cuts intricate designs on ⅝" soft wood, ¼" medium hard plywood and thinner hard woods, plastics, thin metals. Leaves NO ragged undersides on plywood, heavy cardboard. Cuts center of 27" circle. Specially finished table top with ½" cross sectional engraved lines to assist in accurate cutting! This rugged power tool is NOT for ordinary lumber cutting but is unsurpassed for intricate, fancy scroll work. Nothing else like it. Get yours **quickly.** Order now. Limited supply. Prompt shipment.

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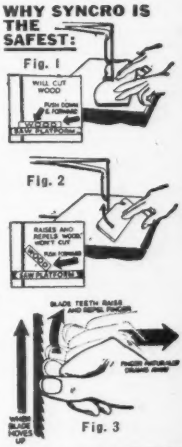

ORDER ON 10 DAYS' TRIAL!

Order today on this liberal Trial Offer: When you get your SYNCRO, plug into any 50 or 60 cycle AC 110-130 volt outlet and saw according to instructions. Then, if it does not satisfy **you** perfectly, return it postpaid within 10 days of delivery date—we'll refund your $17.50 promptly without questioning. Order on Coupon below now!

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Gentlemen: Here's my order for one SYNCRO MAGNETIC JIG SAW. Model 2000, shpg. wt. packed, 18 lbs., $17.50 FOB Factory. Please send it complete with electric cable, plug, 3 blades, on your 10 Days' Money Back Trial. I enclose $17.50 as payment. Please ship saw:

☐ Express charges collect or ☐ Parcel Post charges collect.
☐ Express, for which I enclose an extra $_____
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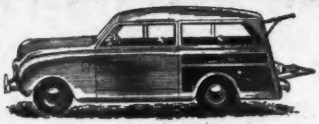
☐ I enclose no money—send FREE SYNCRO CIRCULAR.

WRITE NAME, ADDRESS ON MARGIN BELOW!

NEW CROSLEY STATION WAGON



Smart! Practical! Costs $600 to $700 less than any other station wagon—operates for about ½ as much. Seats 4 in comfort. With rear seat removed hauls ¼ ton load.

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Today's Most Advanced Oil Re-Refining Filter!

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REMOVES SOLIDS (by filtration)
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MAINTAINS Stable Viscosity **ELIMINATES** All Oil Changes!

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You'll want to know more about Reclaimo's Oil, Motor and Money Saving Features. **FREE 40-PAGE BOOK "OIL FACTS"** gives you the complete "Reclaimo" story plus details about our **NEW 90-DAY NO RISK—NO COST TRIAL OFFER!** Write for your copy today!

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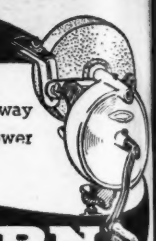

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Only 50¢

Ever since miniature race cars made their appearance over ten years ago the hobby was "restricted" because of the high cost of cars, engines and kits. After over 18 months of effort, MECHANIX ILLUSTRATED has produced plans complete with building instructions for this 13-in. all-metal racer which anyone can build for about 1/4th the cost of the larger cars! Power with any gas or diesel engine from .19 to .49 displacement. Well engineered, speeds over 75 mph are common!

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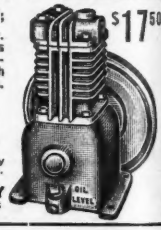
Piston type, size 2 x 1¾, head in valves, bronze bearings splash lubrication. "V" Belt drive. Intake muffler and cleaner. Capacity 2.8 c.f.m. at 100 lbs. continuous pressure, or 150 lbs. Intermittent pressure with ½ HP motor. Can be used with ¼ HP at lower speed. Weight 24 lbs.



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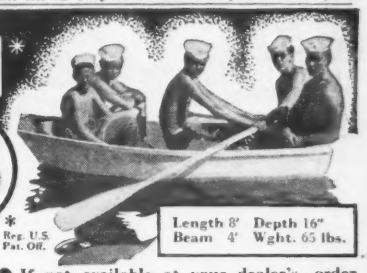
Hagerty Sea Shell*



$35

Rugged for hunting and fishing

Easy to handle, light to carry

Takes an outboard up to 2 H.P.

Assemble your own boat ...Save up to $100.

The Sea Shell is an inexpensive, all-purpose man-sized boat for salt water or fresh. Ideal for fishermen, duck hunters, yachtsmen and youngsters. It's easy to assemble, with precision-cut wood and waterproof plywood parts. Everything is furnished — all you need is a few hand tools, a little leisure time, and a pot of paint. Fun to build and fun to use — you can row it, tow it or use it with an outboard. Sailing kit extra. Ample freeboard makes the Sea Shell sturdy and safe. Fully guaranteed. Send for free illustrated booklet.

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☐ Send Sea Shell freight collect. Enclosing check or M. O. for $35.
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OPERATES AS:

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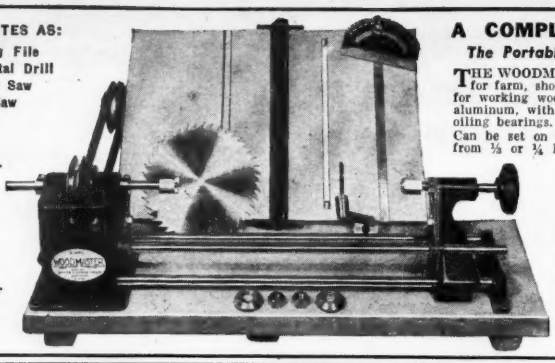
- Circular Saw
- Saber Saw
- Slotter
- Lathe
- Buffer-Grinder-Sander

Dealer and Distributor inquiries invited.



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The Portable CLARK WOODMASTER

THE WOODMASTER is a compact, efficient machine tool for farm, shop, school or home use. An ideal hobby tool for working wood, plastics, or soft metals. Made of cast aluminum, with nickel plated steel parts and oilite, self-oiling bearings.

Can be set on workbench or kitchen table . . . operates from ⅓ or ¼ h.p. motor.

COMPLETE FOR ONLY **$49.85** LESS MOTOR

5% increase for freight west of Miss.

Price Includes: machine base; 12"x19" table rip gauge and mitre gauge; adapters for circular saw; 7" circular saw blade (with 8" blade can cut to depth of 2½" deep); hardened saber saw blade; 2 solid steel lathe guides (24½"); 1 solid steel working bar (20½"); lathe head; lathe points; 2 dual pulleys and pulley belt, and scroll saw attachment.

SEE THIS FINE 7 in 1 TOOL AT YOUR DEALER'S TODAY . . . or if your dealer can't supply you WRITE:

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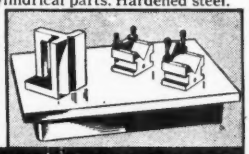
SURFACE PLATE for laying out, surfacing, checking flat surfaces, etc. Precision ground top. 12" x 17" x 3", top 3/4" thick. **Price . . $37.50**

V-BLOCKS for holding cylindrical parts. Hardened steel. All surfaces precision ground. Size 1-15/16" x 2-15/16" x 2-1/4". Capacity 1/4" to 2". **Price per matched pair . . $32.00**

ANGLE PLATE. Precision ground on six sides. 3-1/4" x 3-1/4" x 4-1/4" with 5/8" V-groove. **Price . $20.00**



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8 x 60. MM Objective. Used. Easily made into 20 power with no additional lenses. Instructions furnished. Send $22.50 Postpaid.

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NEW 30" SHEET METAL BRAKE

Forms angles, channels, vees, flanges, locks, pans, boxes. Handles 26 gage sheet steel, heavier gages of aluminum, copper, plastic, etc. Portable. Can be held in a bench vise, or bolted down. All steel construction. Wt. 40 lbs. Shipped exp. collect. ONLY $24.95

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IMMEDIATE DELIVERY is now available on a Foley Saw Filer. Free Plan shows how to start in spare time. No canvassing. Mail coupon today.

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Better Yields—Better Crops

Because this farm-size rotary tiller prepares seedbeds most ideally suited to your soil and crop conditions, it helps produce *higher yields* and *better quality* crops. Can be adjusted for fine pulverization, coarse or medium tillage . . . just the way you want it. Mixes fertilizer and humus into the GROWING AREA of seedbed; aerates soil; eliminates air pockets and hard plow soles; conserves moisture; promotes earlier and more complete germination of seed; helps to destroy many crop pests and certain varieties of fungus; provides effective weed control; reduces erosion . . . all with ONE machine!

SEAMAN ROTARY TILLERS are available in power takeoff and motorized models 3 to 7 ft. tillage widths. See your Seaman dealer and write for complete information.

SEAMAN MOTORS, Inc. 377 N. 25th Street Milwaukee 3, Wis.

FAST! SAFE! LOW PRICED!

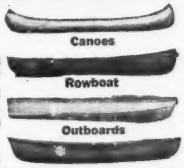
Thompson BOATS

with Full Length Spray Rails

Keep passengers perfectly dry—even at high speeds. Catalog also shows two new models of "Take-Along" boats. Two big factories save you freight.

CATALOG FREE

Write for your copy. State kind of boat in which you are interested.



THOMPSON BROS. BOAT MFG. CO. (166)

230 Ann St. PESHTIGO, WIS. (Write to either place) 130 Elm St. CORTLAND, N. Y.

Easy and Cheap to Operate

SAVE TIME, WORK, MONEY!

SHAW "DU-ALL" and "PEPPY PAL" TRACTORS

PLOW

CULTIVATE

MOW

These rugged walking or riding tractors ideal for farm, truck garden, orchard, poultry farm. They operate on a few cents an hour. A child can handle them.

DO DOZENS OF JOBS

The Shaw Du-All or Peppy-Pal does many jobs quickly and easily. Plows, cultivates, harrows, disks, bulldozes, sprays, hauls, grinds, and saws wood.

BUILT FOR RUGGED WORK

Sturdy, extra-strength construction means low upkeep, long life. Full year's guarantee.

LOW FACTORY PRICES—FREE FOLDER

Buy direct and save! Mass production holds prices down—quality up. Send today for FREE illustrated folder giving complete details and price lists.

SHAW MFG. CO.

2903 Front St., Galesburg, Kans.
668ME North 4th St., Columbus, O.

PRINT ANY PHOTO on Paper, Cloth, Leather or Wood

SIMPLE, EASY TO USE

Magic liquid takes only 2 minutes to reproduce any snapshot you have onto stationery, handkerchiefs, ties, scarfs, etc. Use same picture over and over again if you wish. Won't wash off. Won't hurt negative or fabric it's used on. Personalize your belongings! An ideal gift. Complete outfit enough to transfer 100 photos—only $1.00 postpaid. Sent C.O.D. for $1.21.

TIFFANY CO.

Newport & Long Aves., Dept. 104, Chicago 41

STOP LEAKS In Concrete, Brick or Stone WALLS and FLOORS

Apply Smooth-On No. 7 Iron Cement to cracks, holes, seams and porous spots, wherever there's a leak. Use a trowel or stiff brush. Surface may be wet or dry. In about 24 hours you'll find Smooth-On set hard, the leaking stopped. And Smooth-On will stay in place, for it expands slightly as it hardens.

Buy Smooth-On No. 7 by *name* and *number* at your hardware store in 1-, 5-, 25-lb. or larger size. If they haven't it, write us.

FREE 40-PAGE REPAIR HANDBOOK

Clear, simple directions for stopping leaks, sealing cracks, tightening loose parts in household equipment, autos, etc. 170 illustrations. Just mail the coupon.

---- Sign and Send NOW ----

Smooth-On Mfg. Co., Dept. 69C,
570 Communipaw Ave., Jersey City 4, N. J.

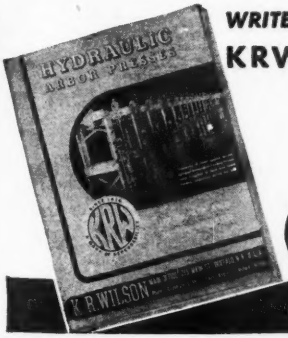
Please send me a Smooth-On Handbook and #7 Folder.

Name .....

Address .....

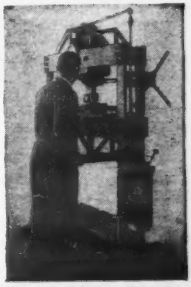
3-48 .....

Do it with SMOOTH-ON NO. 7 IRON CEMENT



WRITE FOR YOUR FREE COPY OF THE NEW KRW HYDRAULIC PRESS BOOK

Describes all manner of Production and Shop Work on KRW Hydraulic and Bench Type Arbor Presses. 32 pages illustrating the new KRW Hand-operated, Electric-operated and Air-operated Hydraulic Presses. *Write for your copy today.*



K. R. WILSON, DEPT. 53, 215 MAIN ST., BUFFALO 3, N. Y.

MECHANIX ILLUSTRATED MAIL-ORDER MARKET

Your advertisement can reach this mail-buying audience of over 600,000 readers for only 40c per word . . . payable in advance . . . minimum 10 words. Copy to be inserted in May issue must be in office March 3rd. Mail to MECHANIX ILLUSTRATED, 67 W. 44th St., New York 18, N. Y.

Word count: Zone number free. Figure one word: Name of state (New Jersey); name of city (New York); sets of characters as in key (14-D); also abbreviations as 35MM, 8x10, A.D. A.C.

ADVERTISING SERVICE & AGENCIES

ADVERTISE: 24 WORDS, 40 Newspapers $3.50. Lists Free. Advertising Bureau, 229-B Dixson, Uniontown, Penna.

24 WORDS IN 64 weeklies $4.96. J. Darnell, 730 Hays, Jackson, Tenn.

AGENTS WANTED

EXTRA MONEY fast. Sell friends exclusive greeting cards, stationery not obtainable elsewhere. 37 boxes. Profits to 100%. Bonus. Quick selling Everyday, Birthday, Gift Wrapping Assortments; Exclusive Name Imprinted, Engraved Name Stationery. Write for free stationery samples and All-Occasion samples on approval. Special offers. Regal Greetings, 19 W. Woodruff, Dept. ML, Hazel Park, Mich.

WANT PLEASANT outdoor work in a business of your own? Good profits selling over 200 widely advertised Rawleigh home/farm necessities. Pays better than most occupations. Hundreds in business 5 to 20 years or more! Products—equipment on credit. No experience needed to start—we teach you how. Write today for full particulars. Rawleigh's, Dept. C-145-MOM, Freeport, Ill.

EARN BIG Money. 21 Sunshine Everyday Cards for $1 with Beautiful Floral Lined Envelopes. Sensational Value. Take orders galore. Costs 50c. Sells $1. Also 1948 Sunshine Notes, Birthday, Monogram Stationery 50 for $1, Gift Wraps, Samples on approval. Write today. Sunshine Art, 115 Fulton St., Dept. MS-3, New York City.

EASY! FASCINATING! Profits to 100%. Bonus. 31 new greeting card boxes 30c up. 5c and 10c individual cards, stationery. Request free Name Imprinted and Floral Stationery samples, free 32-page catalog and $1.00 All Occasion Assortment on approval. Special offers. New England Art Publishers, North Abington 87, Mass.

SCHOOL SENIORS—Sell classmates America's most beautiful graduation name cards. Largest selection. 40% commission. Outsells all others. Send for free sample kit. Printcraft, 1425 E. Elm St., Scranton 5, Penna.

EXCITING DETAILS, shows "How" you make big profits with our fast-selling new lines! Plastic Tablecloths, Aprons; Personalized, Cotton Pillow Cases, many other sales-appealing items, novelties! Write for Big Discount Price List, "Special Deals." Hurry! Royalty, Box 748, Passaic, N. J.

SCHOOL SENIORS. A postal will bring you our wonder, Kwick-Sell Cardalog of popular graduation name cards. Biggest profits! Only firm giving free souvenir chest and card case. Don't miss out. Hurry that postal! Craftcards, Box 235 (AF), Pittsburgh 30, Penna.

EARN MONEY quickly, easily, showing Greeting Cards, Stationery, Wrappings, many unusual items. No experience. Up to 100% Profit. Send today for everyday assortment on approval. Free display folder. Thomas Terry Studios, 200 Union Avenue, Westfield, Mass.

BARGAINS—SAVE up to 50%. Hosiery, Lingerie, Toys, Blades, Spices, Specialties, Carded Goods, Dry Goods, Toiletries, Stationery, Jewelry, Notions, Soaps, etc. Postcard brings Free catalog. Reliable Jobbers, 930 W. Roosevelt, Dept. C-1, Chicago 8.

3 DLS AN hour showing Sparky. Amazing electric gas lighter. Eliminates pilot, matches. 110ACDC. Sample one Dollar. Optica. Research Products, Box 171, Wall Street, New York 5, N. Y.

EXCELLENT SIDELINE for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also, make money with our line of Automobile Initials and Sign Letters. Free Samples. "Raico," XL-Roxbury, Boston 19, Mass.

SILVER CLEANING, Plating, Polishing Liquid (NuSilver). Apply with cloth. Renews silverplated ware, articles, pieces. Silverplates brass, copper, bronze. Female, male selling representatives wanted. Part, full, time. NuProcess Products, Aurora, Ill.

AMAZING OFFER—$25 is yours for selling fifty $1.00 boxes of entirely different new De Luxe All-Occasion cards. Each box sells for $1.00, your profit 50c. It costs nothing to try. Write today for samples. Cheerful Card Co., Dept. 275, White Plains, N. Y.

MAKE MORE money selling personal initialed individualized belts, buckles, cap badges, tie holders, 2000 emblems to choose. Big profits, whole or part time. Write today. Special outfit offer. Hookfast Specialties, Box 1425, Dept. 4, Providence, R. I.

FREE! BIG box actual full size packages foods, groceries, home needs, sent fob factory. Try them at home and show friends. World beating money making opportunity Write Zanol, Richmond Street, Dept. 6095-B, Cincinnati 3, Ohio.

BE INDEPENDENT, run your own magazine order business. No capital, no experience needed. Help furnished. Opportunity unlimited. Send today for Free Wholesale Catalog. McGregor Magazine Agency, Dept. 11, Mount Morris, Ill.

CALL ON friends with greeting card assortments, birthday, get-well, others. Floral stationery. Gift wrappings. Big profits. Experience unnecessary. Samples on approval. Wallace Brown, 225 Fifth Ave., Dept. C-4, New York 10.

FREE SAMPLE! Big profit opportunity with amazing Glow-in-the-Dark House Numbers, Switch Plates, Pictures, Decals, Religious Articles. Represent large manufacturer. Madison Mills, 303 Fourth Avenue, New York, N. Y.

ABSOLUTELY FREE! Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 4590, Cincinnati 3, Ohio.

AGENTS WANTED for our coin operated amusement machines in every town and community. Sell to clubs and homes; or start a route. Webb Distributing Co., Dept. M-12 6 S. Kedzie Ave., Chicago 12, Ill.

SELL NEW-USED clothing from home, auto, store. Men's suits $1.17. Leather Jackets 85c. Overcoats 62c. Dresses 17c. Ladies' Coats 38c. Other Bargains. Catalog Free. S&N, 565A Roosevelt, Chicago.

RED HOT Items for Quicksales—Big Profits in each monthly release of New Products Bulletin—100 or more opportunities. Copy $1.00. Details Free. Glenn Snyder, 5 Spring, Beachwood, N. J.

WOULD YOU pay 3%—first $350 made? Color-illustrated book "505 Odd Successful Enterprises" free! Proven! Work at home, office. Expect something odd! Pacific, Oceanside, Calif.

"FORTIFY THE FUTURE" Start own business; home, office. Booklet describing "Collection of 137 Tested Plans" free. Elite Co., 220-G Grand St., New York 13, N. Y.

EARN BIG money fast! Sell finest quality advertising work uniforms to garages, factories, filling stations, etc. Free selling kit. Topps, Dept. M1-248, Rochester, Ind.

STRANGE "DRY" Window Cleaner. Sells like wild. Replaces messy rags, liquids. Simply glide over glass. Samples sent on trial. Kristee 119, Akron, Ohio.

A DRESS Yours with every 3 you order for yourself and family. Amazing new bonus plan. Everything Free. Harford Frocks, Dept. J9130, Cincinnati, Ohio.

GREETING CARD moneymakers. Easter, Motherday, Birthday. Descriptive folder free. Greenport Art Company, Dept. 831M, Brooklyn 15, N. Y.

INFORMATION—WHOLESALE supply sources. Moneymaking plans. Increase your income! Write Reynard Research, Smithfield 3, Ohio.

MAKE PERFUME—Profitable sparetime-home business—Men, Women write "International," 6347 Parnell-7, Chicago 21, Ill.

GET 400 MONEY Making Ideas. Formulas. Plans. Schemes. Folio Free. Formico-Spec., Box 572, Dayton, Ohio.

MAKE MONEY at home like I do! Write immediately. Duffy, (8) Covington, Ky.

AVIATION

AAF FAIRCHILD Sextant with averaging device $12.50; Bausch & Lomb Sextant (marine or air) $27.50 (former cost $502.00); Hamilton GCT Master Navigation watch $27.00; Elgin Stop Watch $12.50, F8 Aerial Cameras $175; Gun Cameras (new) $30.00; Astro Compasses (new) $12.50. (Free Folder.) Pan American Navigation Service, 12021-M Ventura Blvd., North Hollywood, Calif.

BUILD, FLY bullet raceplane. Fast, light monoplane. Blueprints $2.00. Corberaft, 80 Maxwell, Rochester 11, N. Y.

PROPELLERS FOR ice-snow sleds, air boats, catalog 10c. Banks Propellers, R.F.D. 12, Ft. Worth, Tex.

AUTHORS' SERVICE

I WANT new writers to cash hundreds of checks for $1 to $100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for free details. No obligation. Saunders M. Cummings, 467-B Independence Bldg., Colorado Springs, Colo.

BARGAINS

MOLDS, 80c UP. Send 80c for mold of new fruit plaque or send 50c for sample of new liquid self-vulcanizing rubber compound makes molds overnight for six to ten cents each. Dee's Products, 143 W. 65th St., Chicago 21, Ill.

SALE! STURDY New Men's Wrist Watches (bxd.) only $4.80 each tax included. No C.O.D.'s. Order Now and Save! (Make your address clear.) Rand Sales, P.O. Box 363, Willmar, Minn.

BARGAIN OFFER, 200 6¾ Envelopes, 100 8½x11 Letterheads and 100 Statements $3.75. Two Scratch Pads Free! Keyeskraft, Flora, Ind.

"84 CARD TRICKS," 25c. "Scientific Boxing," 50c. Hirsch, Spring Valley 1, N. Y.

SALESMEN WANTED

ADVERTISING BOOK matches—World's largest direct selling manufacturer of Advertising Book Matches offers opportunity for profitable year 'round selling; every business a prospect. No experience needed to start full or part time; factory service; low prices for high quality; repeats; sales kit furnished. Match Corp. of America, 3433-43 West 48th Place, Dept. A-16, Chicago 32, Ill.

START YOUR own business on our capital. Always your own boss. Hundreds average $6,000 to $25,000 annual sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. C-U-MOM, Freeport, Ill.

ADVERTISING BOOK Matches—Cash in on political campaigns—sell Union Label matches. Cuts for all businesses and political parties—Free powerhouse selling kit—low prices—protection guaranteed on repeat orders—Cash Commissions. Superior Match Co., Dept. F-38, 7530 Greenwood, Chicago.

SALESMEN: BIG money showing building owners sensational product; cuts essential repair cost up to 75%. Six average orders weekly pay you over $190.00. Age: 30 or over. Get money-making facts. Write, Zone Co., Dept. C-7, Box 789, Ft. Worth 1, Tex.

BIG CASH Profits Daily Taking Orders; Uniforms, Shirts, Ties, Personal Initialed Individualized Buckles, Belts, Cap Badges, Tie Holders, 2,000 emblems. Repeats. Write today. Special Outfit Offer. Hook-Fast Company, Box 480-MI, Roanoke, Va.

POCKET PAL: Replaces Pocket Knives. New, Safe, Beautiful. Always Razor Sharp. 50c seller. 231% profit. $15.00 or more daily. Agents, Salesmen, Distributors. Sample 10c. Nelson Mfg. Co., 222 W. Kellogg, St. Paul 2, Minn.

SALESMEN. EARN $100.00 weekly, selling only six pair shoes daily. Commission and bonus. Wide variety for men, women, children. No investment. Experience unnecessary. Tanners Shoes, 214 Boston, Mass.

AMAZING NEW Zipper Shoe sells on sight. Big cash profits for salesmen. Leads line 200 splendid styles. Territory open. Get Free sample outfit. Write Consolidated, Dept. S-52, Chippewa Falls, Wis.

AMAZING DISCOVERY. Master Glaze, puts brilliant glass-like surface on cars. Free Sample. Information. Big commissions. Master Glaze, Dept. 639, 7720 Harwood, Milwaukee, Wisc.

BIG MONEY Taking Orders; Shirts, ties, sox, pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment Free. Experience unnecessary. Nimrod, 4922-AR Lincoln, Chicago.

SALESMEN—WANT to increase repeat orders? Write Sinclair Advertising, De Land, Fla.

BUSINESS OPPORTUNITIES

COIN MACHINES earn big money! Machines are now available at $11.75 that can earn as high as $7.00 weekly profit. Place machines in stores, hotels, filling stations, etc., and your income starts immediately. Routes can be operated in spare or full time with no experience needed. We'll tell you how and send you a catalogue describing our nut, candy, gum, and postage vendors, also scales, amusement games, etc. Write immediately to Parkway Machine Corp., Dept. M, 623 W. North Ave., Baltimore 17, Md.

MAKE MONEY casting new line metal toys and novelties. Latest scale model autos, original ashtrays, savings banks, water pistols, etc. Big wholesale and chain store orders now being placed at high prices assure big business and profits. Spare or full time. No experience or special place necessary. Write for details and illustrations of patterns needed. Metal Cast Products Co., Dept. 2, 1696 Boston Road, New York 60, N. Y.

BIG EARNINGS in advertising for the trained man. Huge field with unlimited possibilities. Fascinating, different work you'll enjoy. Comprehensive new course tells How To Write, Design and Sell Advertising. Start your own agency or work for big firms. Descriptive folder Free. Mastercraft Enterprises, 10 West Ohio, Indianapolis 4, Ind.

BIG PROFITS in broadcasting stations. 1,000 (Citizens only) may invest $100.00 in new station, and engineering service, in New Orleans. 100% return Guaranteed within 10 years, plus share profits. Don't delay. Rush check to J. G. Cooper, Box 823, Lafayette, La.

SPECIALTY MANUFACTURING, the big money business that can be operated anywhere, start on a very small capital; we supply dependable formulas and complete instructions; get interesting Free booklet, "Money-making Opportunities in Specialty Manufacturing." Howard Robinson, Ph.G., 1300-D South Ohio Street, Sedalia, Mo.

ELECTRICALLY INCLINED men. Amazing illustrated literature free, proving $100-$250 weekly possible installing maintaining fluorescent lighting. Rebuild fixtures for excellent profits. Make beautiful lights for 50c each and less. Free sample materials. Write Willis Fluorescent Service, 101 York Street, Brooklyn 1, N. Y. Dept. B.

BIG MONEY made with your own vending machine route. Small investment starts you building this dependable profit-making business in sparetime. Big money-maker after established. No experience necessary—we show you how. Write for "no risk—no loss" starting offer. No obligation. Becker Vendors, 105-H Dewey, Brillion, Wis.

A PROFITABLE business of your own with amazing Liquid Ivory, one of the most marvelous synthetics ever developed. Hard to tell from genuine ivory. Easy to start. Experience unnecessary. No long wait for profits. Write for catalog and free details today. Empire Trades, Dept. I-3, Box 1340, St. Louis, Mo.

INTERESTED IN Latin American and Foreign employment? $1.00 brings 'copyrighted Foreign Service Directory with Hot List of concerns interested in Oil, Mining, Aviation, Construction, Transportation, Manufacturing. How-When-Where to apply. Global Reports, P.O. Box 883, Dept. MI, Hollywood 28, Calif.

BRUSH PLATING Outfits connect to a battery. No tanks necessary. Almost as simple as painting. Your opportunity to make good income plating, autoparts, bathroom fixtures, reflectors, mirrors. Get free proof and particulars that put you in a paying business of your own. Gunmetal Co., Ave. A, Decatur, Ill.

MECHANICALLY INCLINED Men—Own and operate general Appliance Repair shop. Complete, illustrated course shows you how. Welding, Refrigeration, Motor Repairs, How To Get Business, etc., all phases covered. Free literature. Christy Supply, Dept. 280, 2835 N. Central Ave., Chicago.

WHITE LIQUID Rubber for making flexible molds! Quick drying! Safe! For home, classroom, or industry! Quart $2.00. Gallon $5.95. Full instructions! Beginners' booklet on molding and plaster casting 25c. Free with order! Plastercraft Supply Company, 1406 East 43rd Street, Cleveland 3, Ohio.

NEWEST IDEA in Finishes. Flok-Kraft Synthetic Plush sprayed on all shapes, surfaces. Beautiful soft texture covers mended radios, furniture, figurines, lamps. Profitable, Entertaining. Supplies, equipment, free instructions. Coast, 1507 West Manchester, Los Angeles 44.

PLASTER PARIS gets hard as stone. Just mix in "Roe," amazing new chemical—Air bubbles come to surface, disappear. Finished casts hard, ring like a bell. Enough for 2,000 casts only $1.00 Postpaid. Money back guarantee. So-Lo Works, Dept. C-202, Loveland, Ohio.

PLAY WITH Wonder—All the new action bouncing stick game hundreds of stunts all ages, carry in pocket, play anywhere amazing, entertaining, healthful—exercise. Sample Dime and 2 three cent stamps. Details Free. P. Agrillo, 33 West 6th St., Gilroy 1, Calif.

RUBBER MOLDS, Natural Liquid Rubber, Flock Filler (for making thick sectional molds), Statuary Plasters, Paints, and new colored Felt Finishes for novelties. Catalog and "Plastercraft" course free. Blue Rapids Supply, Box 415, Blue Rapids, Kans.

BUSINESS SUCCESS made easier with the new simplified Success Chart, the magic key to wealth—leisure—happiness—given free with folio "Business Success for You" $1.00 postpaid, order now. R. H. Betscher, 6709 Merwin, Cincinnati 27, Ohio.

GET IT for them wholesale. Be community buyer nationally-known merchandise; radios, refrigerators, washers, sweepers, typewriters, etc. Savings up to 50%. This pleasant easy work can earn up to $5000 year. Get details today. Kraft, Aurora 10, Mo.

LIQUID MARBLE—make in any color. Soundproof Plastic Flooring. Flexible Molds. Cast novelties, plaques, statuary. Big Money—your own business. Catalog Free. Write—Bing Products, E3W Broad Street, Boston 10, Mass.

AT HOME—Your own manufacturing business; making popular $1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. C-602, Loveland, Ohio.

COLORGLAZED CONCRETE pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leaksealing. Money-making projects. Booklet, details free. Men only. National Pottery, Grand Rapids, Minn.

START YOUR own Electroplating Business. Highly Paid, Uncrowded Field. Learn at Home in Spare Time. Send postcard for Free Electroplating Booklet and Proof. Plater Hyde, Room 525, 432 "F" Street, San Diego 1, Calif.

START A clock shop. Fascinating, easily learned, profitable business requiring little capital. We teach you how to repair all kinds of clocks. Information Free. Houston Clock Shop, P.O. Box 5086C, Houston 12, Tex.

RUBBER MOLD Makers: One simple item makes your liquid rubber go 150% further. Free instructions for above 6/7: "Liquitex Makers" with sample rubber. Southern Service, Box 3303-F, Jacksonville, Fla.

YOUR OWN plastic business at home. Produce costume jewelry, novelties, statuettes. Liquid plastics, liquid marble. Flexible molds. Write for free book. American Trades, Box 89-C-2, Cincinnati 29, Ohio.

WOULD YOU pay 3%—first $350 made? Color-illustrated book "505 Odd Successful Enterprises" free! Some offer occasional "day off." Work home. Expect something odd! Pacific, Oceanside, Calif.

A FACTORY in your home garage! Mfg. and sales rights, mechanics' waterless hand cleaner. $500-$800 monthly. No special equipment necessary. Western Aircraft Mfg., Dept. H, Los Angeles 6, Calif.

START HOME business making statuettes, plaques, artificial marble flooring, liquid marble, flexible molds, metallizing baby shoes. Amazing profits. Folder free. Creative, 236-A, Winnetka, Ill.

BUYERS WANTED for plaster novelties and Religious statuary. Painted—unpainted. Retail—wholesale. Write today for free information. Bing Products, 88-X10E Broad, Boston 10, Mass.

LEARN PIANO Tuning, Repairing, at home. Tremendous field! Piano parts, tools furnished. Established 1935. Empire School of Piano Tuning, 606 East University Ave., Champaign, Ill.

MOLD PLASTICS, Compositions, Plasters. Simplified methods. Tremendous profits. Investment small. Instructive literature free. Plastics Digest, 2917-G Michigan, Kansas City 3, Mo.

CREPE PAPER Moneymaking techniques. Pleasant home business or hobby! Copyrighted illustrated instructions 60c. Millett Crepecraft, 3754 Menlo, Dept. 3, Cleveland 20, Ohio.

TRAVEL ANYWHERE: Anytime. Earn $85.00 week up. Be your own boss. No experience necessary. Less than $5.00 investment required. Literature free. Travel, La Grange 5, Ind.

HANDY CLOTHES Line Reel. Make it yourself. Be the friend of housewives. Send one dollar for pattern and instructions. K. Spade Products, Box 270, Mendon, Mich.

EXTRA DOLLARS or a good living with your typewriter. New, exclusive opportunity. Never before offered. Get details now. Schroder, 221 Bush, Covington 4, Ky.

EXCLUSIVE DISTRIBUTOR. Plasticized beauty-protection for auto finishes. Used like polish. Must fin. own stock. Plasticize, 2254 N. W. 62nd St., Miami, Fla.

START PROFITABLE Mail Order Business. Run Ads, Forward Orders, Keep Big Cash Commissions. Details Free. McKitrick Publications, Mt. Vernon 10, Ill.

BABY SHOES, we metallize hundreds and will teach you how. Easily learned in quick time. No experience needed. Schoettle, Friendship 3, Ohio.

OPERATE PROFITABLE home business selling merchandise by mail. Fast sellers. Large profits. Powell Service, 5713 Euclid, Cleveland 3, Ohio.

MAIL ORDER Offers Increased Income, Independence, Unlimited Possibilities: Free Literature. Manhattan House, 126-N Lexington, New York 16.

LIQUID RUBBER for making flexible molds. Cast novelties. Sample bottle 25c. Free literature. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

WATCHES, WHOLESALE. Rebuilt-like-new Elgins, Walthams, Bulovas, etc., $9.75 up. Catalogue free. Brockings, B-L1975, Little Rock, Ark.

HOW AND Where to obtain capital. Particulars free. Star Service, Wapakoneta, Ohio.

LEARN LYCOPODIUM, Ruscus Silvering and dye glorious Easter colors. Supply Florists. Lycopodium Foundation, St. Paul (8), Minn.

BE YOUR Own Boss. Metallize baby shoes at home spare time; your own business. H. Schwieger, 8404 W. Chestnut, Wauwatosa 13, Wis.

DO IT with sea shells. Attractive jewelry, novelties—instruction, supplies, big profits. M. Werts, 1429—56th Avenue, Oakland 3, Calif.

MAKE PERFUME—Profitable sparetime-home business—Men, Women write "International," 6347 Parnell-6, Chicago 21, Ill.

START OWN Business—home, office; booklet describing "137 Business Plans" free. Elite Co., 220-G Grand Street, New York 13, N. Y.

SELL BY Mail! Books and novelties! 35 different items! Large Profits! Catalog free. ELFCO, 432 N. Wells, Chicago 10.

PROFITABLE BUSINESS at home making rubber stamps, perfumes. Free details. Thos. Law, 54 East 99th, New York 29.

BABY SHOES preserved. Formulas, instructions $1.00. Supplies, Bases. Novelty Bronzing, Box 56, Hyde Park 36, Mass.

BABY SHOE metallizing. New system assures success. Details free. Treasures Forever, 89-A Henry Ave., Lynn, Mass.

FREE LITERATURE describing 137 proven money-making plans. Reiss, 3017-E Ocean Parkway, Brooklyn 24, N. Y.

$25 WEEKLY WORKING two hours daily. No canvassing. No manufacturing. Lycke, Box 2471, Cleveland 12, Ohio.

HANDYMEN—EARN money home operating Community "Fix-It" Shop. Write Stafford, 708 Rawlings, Carbondale, Ill.

MOLD-MAKING. PLASTER Casting. Moneymaking Home Business. Literature free. Kemixal, Parkridge, Ill.

HOW TO Set Up and Run a Mirror Shop! Resilver Mirrors. For price write—John Sprinkle, V33, Marion, Ind.

MANUFACTURE CLEANERS — Flavors — Cosmetics—Polishes. Formula Catalog Free. Kemico, Parkridge 60, Ill.

400 MONEY PLANS. Ideas. Formulas. Tips. Success schemes. Folio Free. Formico Mo., Box 572, Dayton, Ohio.

QUICK MONEY! "Repairing Car Batteries." At home! Easy too! Write, Batteryman, Grand Junction, Colo.

$126.50 GUARANTEED WEEKLY. Send $1.00 deposit. Stannette, 277 Madison Street, New York 2.

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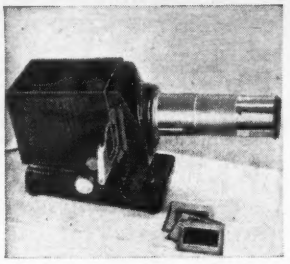

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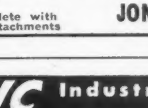

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$145.00 AND UP

f. o. b. factory, less electrical equipment and bench.

You can buy a South Bend 9" Lathe on time payments.

9" x 3' South Bend Model A Bench Lathe

FEATURES AND SPECIFICATIONS

SWINGS—9¼" over bed and saddle wings
5½" over saddle cross slide

BED LENGTHS—3, 3½, 4 and 4½ feet

DISTANCE BETWEEN CENTERS—16 to 34 inches

SPINDLE SPEEDS—
depending on type of drive equipment
Six—41 to 658 r. p. m.
Twelve—41 to 1270 r. p. m.
Sixteen—46 to 1176 r. p. m.

POWER LONGITUDINAL FEEDS—
Model A Lathes—48, .0015" to .0853"
Model B Lathes—26, .0021" to .0155"
Model C Lathes—14, .0021" to .0156"

POWER CROSS FEEDS—
Model A Lathes—48, .0004" to .0252"
Model B Lathes—23, .001" to .0046"
Model C Lathes—manual operation

THREAD CUTTING RANGE—
Model A Lathe—48 pitches, 4 to 224 per inch
Models B and C Lathes—45 pitches, 4 to 160 per inch

MAXIMUM COLLET CAPACITY—½ inch

QUICK CHANGE GEAR BOX—Model A Lathes

PLAIN CHANGE GEARS—Models B and C Lathes

The quality that is built into South Bend 9-inch Precision Lathes enables them to produce quality work with efficiency under all conditions. Regardless of the type of machining—between-centers, collet, fixture, or chucking—close tolerances can be maintained and a maximum volume of fine work produced with a minimum of effort. Write for Catalog 9-J which fully describes and illustrates all South Bend 9" Precision Lathes and attachments. Larger sizes with 10", 13", 14½", and 16" swings are also shown.

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COLLET ATTACHMENTS	CARRIAGE STOPS
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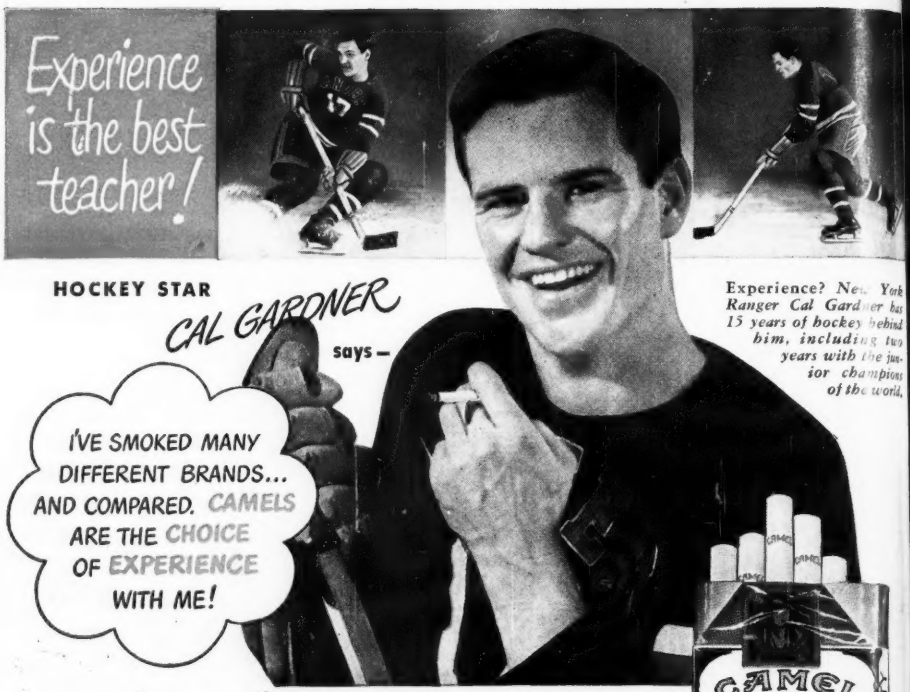

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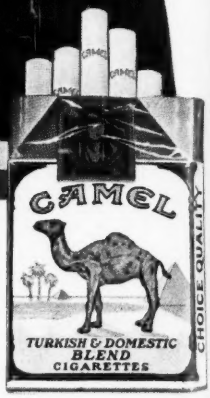

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